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F. M. CROSSETT, M.S.
New York

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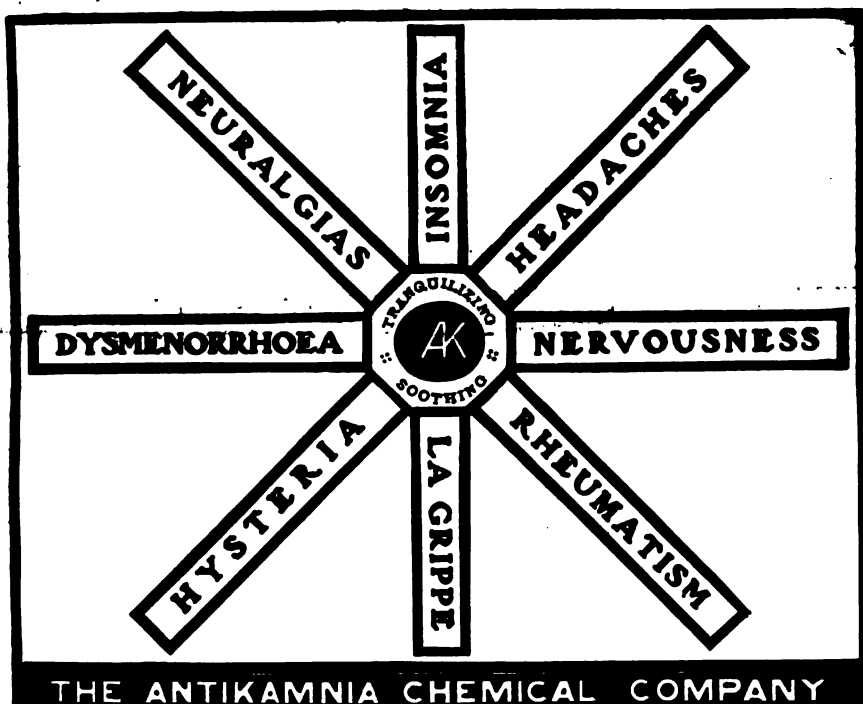
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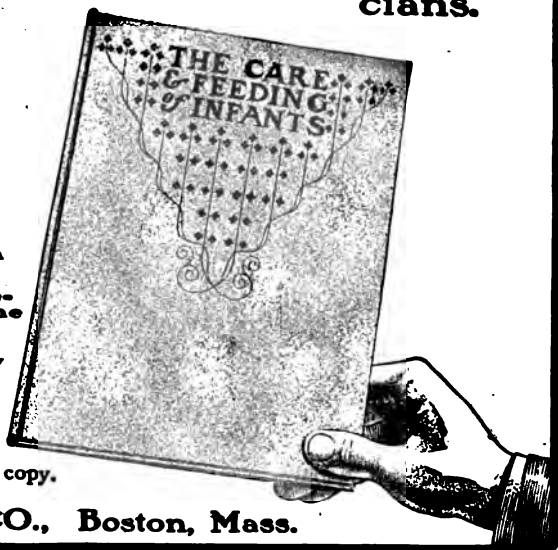
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PEDIATRICS

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No. 3

ORIGINAL ARTICLES

THE NATURAL NOURISHMENT OF INFANTS.

BY DR. JOH. HUGO SPIEGELBERG,
OF MUNICH.¹

(Translated by Henry Larned Keith Shaw, M.D., Lecturer in Pediatrics,
Albany Medical College.)

L. Emmett Holt in his widely known text book on "Diseases of Infancy and Childhood," says in substance that while nothing is as good as breast milk, yet improper breast milk gives most unfavorable results. He also says that among the upper classes where the milk can be properly prepared and attended to, "one should not be slow in adopting artificial feeding in cases of doubt." It would appear from this that the nursing ability of the American women has not yet reached a satisfactory state of development. Holt himself states that not more than a fourth of the mothers in his private practice who earnestly desire to nurse their infants are able to continue longer than the third month.

These words impressed me strongly because they reveal not only the confidence our American colleagues place in the artificial feeding of infants, but also the relative unimportance they place on breast milk feeding. As a natural consequence physicians remove the baby from the breast for slighter provocations than the teachings and experiences of the German pediatricists permit. The employment of wet nurses unfortunately is not so generally adopted in America as with us and the difficulties in securing a suitable wet nurse tend to restrict further the natural form of nourishment. It must be said that even in Germany the ability of the women to nurse their infants is still far from perfect but by earnest endeavor and proper instruction many women can still

¹Courtesy *Albany Medical Annals*.

be brought to fulfill this first and most important duty to their children. The conditions of life and the demands of society at the present time, however, render maternal nursing an art requiring a certain amount of what might be termed technical instruction in addition to a physiological ability to nurse.

It is my purpose in discussing breast milk feeding not to dwell upon the commonly accepted axioms or unimportant details. The vast importance of breast feeding in comparison with any substitute is too little recognized by the profession at large. Physicians should be convinced that unless wellgrounded contraindications exist, days, weeks or a few months of breast feeding even if it supplements artificial feeding to a small degree is an advantage of great importance not only to the immediate development of the child but also for his whole life. Nothing can take its place and it should not be withheld from the child.

The sense of duty that induces a mother to nurse her child is gradually extending more and more owing to earnest work by physicians. Where this feeling is lacking it should be aroused. The question asked by the public "Shall I nurse?" should no longer be a question for the physician. The query is merely "Can she nurse?" with the subsidiary question "May she nurse?"

To consider the last question first it must be said that there are but few circumstances that prevent a woman from nursing. No general rules can be laid down but each case must be determined on its own merits by the physician.

Syphilis.—An uninfected mother should only be advised or permitted to nurse a child infected congenitally through the father if knowing the conditions she voluntarily consents for the sake of the child which in such cases is usually debilitated and often premature. On the basis of Colles' law such mothers are relatively immune against infection through their children but exceptions have been recorded especially among primipara. A syphilitic mother may not nurse an uninfected child. If both mother and child are affected it is doubly important for the child that it should be nursed by its mother.

Tuberculosis.—Tubercular infection in the mother is an absolute contraindication for nursing. The danger lies not in the passage of toxins or bacteria through the milk but in the intimate associations between the mother and the child. Even though the

mother does not nurse she must exercise the greatest care not to infect the child. The function of lactation, moreover, is a drain upon the system of tubercular women that must be strictly guarded against.

Acute Infectious Fevers.—Fever in general form no contraindications to nursing unless associated with marked prostration or collapse. There is no reason, for instance, why a mother suffering from diphtheria should not nurse her child if stringent precautions are observed against infection through the air, clothes, etc. The fever itself exerts no deleterious influence on the milk and immunization of the child is affected through the milk in a number of these cases.

Nervous System.—The strong influence exerted by the nervous system upon the secretion—not the formation—of the milk is well known. It is unscientific to say that mental disturbances and diseases can be transmitted through the milk from mother to child. Moreover it has not been proven that the chemical or physiological composition of the milk are directly affected by nervous disorders. The quantity and quality of the milk, however, depends much on the regularity and completeness with which it is taken from the gland. Resorption takes place if the breasts are not regularly emptied. This resorption slowly produces certain changes in the quality of the milk and a resulting diminution in the quantity. As the secretion of the mammaræ is influenced in a pronounced manner by the general nervous alterations it follows that nursing difficulties are more frequent in “nervous” women. It must be determined in each single case whether or not these difficulties are sufficient to forbid nursing.

The question “Can the mother nurse?” must partly be considered before the birth of the child. Mothers who have successfully nursed one or more children and whose health and breasts have suffered no change probably will have no difficulty. The widely spread inability to nurse lies chiefly in the inactivity, hereditary atrophy of the mammaræ, bad customs, etc. In these cases very often can the succeeding generation be made capable of nursing by proper prophylactic care.

The presence of the glandular tissue, which must be differentiated from adipose tissue, can be detected by palpation towards the end of pregnancy. The secretion of a few watery drops shows

that the function of the glands is normal. Rubbing the nipples and breasts with alcohol is a good preparation for nursing as it tends to harden the skin and renders it less liable to irritation and disease.

Mastitis and depressed nipples are the two most important external contraindications to nursing. If the infant cannot grasp the nipple the best breast is of no value. Massage of the nipple has little effect when the depression is of a severe grade but for the simpler cases the breast pump or certain mechanical nipples can be employed. The nipples and breasts are not fully developed until lactation commences. Cleanliness of the parts and regular and complete emptying of the breasts will prevent mastitis.

The most frequent excuse or reason given for not nursing is that there is "no milk" or "not enough milk." In order to discuss this point intelligently we will briefly consider the physiology of lactation. A few drops of a yellowish watery fluid appear towards the end of pregnancy. This fluid becomes more profuse a few hours after birth until the second day and can be squeezed out in a fine stream. This first milk or colostrum is rich in globulin and poor in fat. It forms a transition period in the production of milk. The colostrum bodies are leucocytes which remove the fat from the milk as long as no removal of the milk takes place. Any later damming back and resulting absorption results in the reappearance of this colostrum milk. The colostrum disappears and normal milk appears as soon as the infant is able by vigorous sucking to establish the full secretive powers of the glands. The breast milk is slower in appearing where there is any interference with a complete removal. Weak and premature infants, undeveloped nipples, breasts, etc., are among the causes producing this interference. Artificial removal should be employed in these cases or another and older infant placed on the breast. The latter means is the rule in our foundling asylums and babies' hospitals.

Whether the breast can secrete enough milk cannot be judged before the tenth to fourteenth day. A complete removal with avoidance of retention is the Golden Rule of lactation and with this precaution nearly every mother can be safely carried through the puerperal period perfectly able to nurse her baby. During the entire period of lactation the same rule should be observed.

"La quantité du lait varie avec la demande," says Budin and

the experience in our Säuglingsheim confirms his view. There the wet nurses are able to nurse two or three infants and yet can withdraw milk by massage for the sick infants. Professor Schlossman in Dresden has wet nurses who can furnish as high as four and three quarter liters of milk daily and in our Munich Säuglingsheim the same amount has been obtained without difficulty. The reverse of this experience is often seen when a good wet nurse leaves the hospital to go into a private family and is soon sent back because "she has no milk." The reason for the incomplete removal lies in the small size or weakness of the baby or in bad habits of nursing such as irregular and too frequent feeding. The appetite of the child is thus destroyed and the breasts become accustomed to secrete only small quantities of milk. The remainder is reabsorbed and the total amount diminished. The following case illustrates this point. A wet nurse at our Säuglingsheim secreted two and a half to three liters of milk daily and left to take a position as private wet nurse. She was returned to the hospital in less than two weeks with the complaint that there was not enough milk. A test at that time showed the milk reduced in quantity to 100 cubic centimetres. At the end of a week under the original hospital conditions the amount of milk had risen to two and a half liters per diem. This seems to demonstrate the truth of Budin's axiom. Since these women are able to produce more milk than is required for one child it follows that every healthy woman is capable of producing a normal amount of milk provided the nursing is governed by the rules already mentioned. Nevertheless no physician would deny that some women are incapable of producing a requisite amount of milk. Such women should never omit to nurse their babies as much as they are able and the deficiency should be replaced by artificial feeding. This "allaitement mixté" to which we will refer later, enables many mothers to give their infants the benefits of partial breast milk feedings. It may lead to a more copious secretion and even to a normal nursing ability in later lactations.

The baby should not be taken away from the breast during the first few weeks of life on account of insufficiency of the milk unless it is absolutely necessary. The involution and puerperal period are benefited by regular nursing. The child should be

given the breast for the first time from six to twelve hours after birth. It is often a difficult and long struggle to make the infant take hold of the nipple.

The nursing should be repeated at irregular intervals until the child begins to drink. Then the intervals should be gradually lessened to three hours. Only premature or otherwise weakly children should be nursed more frequently. In the second six months four-hour intervals will rarely be too long and these may be later increased to five hours. The stomach should be empty before it again receives food. The night feedings should not be oftener than six or eight hours. Regularity in nursing diminishes the care of the mother and interferes less with her ordinary duties and habits. The first nursings are quite painful and the uterine after-pains show the close physiological relation between lactation and involution.

The entire nipple should be taken into the child's mouth, as one of the most common causes of fissures is an incomplete grasp of the nipple. These fissures are extremely painful and present points of entry for bacteria and a resulting mastitis. They should be properly treated but they do not form a sufficient ground for interrupting the nursing. The child can swallow blood from the fissured nipple—which may cause vomiting and bloody stools and give rise to a faulty diagnosis (*melæna*).

I shall not enter into a consideration of the chemistry and physiology of milk nor the differences between mother's milk and cow's milk. It is well known that breast milk is subject to marked changes in different individuals and in the same individual at different times. The first milk from a normal breast is low in fat and high in proteids and at the end of nursing the fat is high and the proteids low. Pawlow has shown that fat and albumin together are very difficult of digestion. The fat retards the gastric secretions and increases the pancreatic juices so the albuminoids are not acted upon by the proper gastric ferments. Breast fed babies therefore have the decided advantage of digesting the albuminoids before the fat is received in the stomach.

The physician should always examine the milk whenever there are disturbances warranting it. The examination should include the macroscopic appearance (color, consistency, etc.), microscopic (colostrom, size of fat globules) specific gravity, sugar and fat

determination. The Babcock method is much used in America for the estimation of fat. The quantitative determination of sugar can be made by Fehling's method. In place of the tedious quantitative estimation of the proteids one can determine the amount of total solids and deduct the percentages previously determined for fat, sugar, and salts (.2 of 1 %) [*Medical Record No. 14, 1903*]. The appearance of colostrum corpuscles during lactation always indicates a resorption of the retained milk and the danger of the milk's drying up can only be prevented by a thorough emptying of the breast. In such cases the amount of colostrum will have prognostic value.

When a nursing infant is taking enough proper milk there will be a uniform gain in weight. The infant should be satisfied with seven feedings at first of from ten to twelve minutes duration and later this number may be reduced to five.

As the majority of our mothers are incapable of sufficiently nursing their children it is of great practical importance to determine the average amount of milk necessary for a normal nursing child. Numerous observations of the average amount of milk taken by normal breast babies at different feedings has appeared in the German as well as foreign literature. Those who have systematically weighed a baby before and after a nursing know that the quantity taken at each nursing varies as well as that taken for the entire day—another essential difference between physiological and artificial feeding. From calculations made by different authors it can be said that a strong breast baby in the first two months consumes daily about one-fifth of his body weight of milk. In the second quarter of the year this quotient diminishes to one-sixth or one-seventh and in the later months to one-eighth or one-ninth. For example, a two months' old child weighing 4000 grammes would take one-fifth of 4000 or 800 grammes daily. A six or seven months' old child weighing 7000 grammes, would take at the utmost 1000 grammes.

From the most reliable observations I have prepared formulæ that express this relation and can recommend them as being fairly reliable for the average feeding. They can be adapted for any infant at any period of lactation.

The quantity of mother's milk is represented by x , the weight of the child by p , the age in weeks by w , and the age in months by m .

The formulæ from one to six months would read $x = \frac{p}{100} \times \frac{78-m}{4}$

Example. A child of six weeks weighs 4200 grammes.

$x = \frac{4200}{100} \times \frac{78-6}{4} = x = 42 \times 18 = x = 756$ grammes, the required amount of milk.

For the remainder of the time the child is fed upon milk the formulæ would read: $x = \frac{p}{100} \times (20-m)$.

Example. An eight months baby weighing 8500 grammes.

$x = \frac{8500}{100} \times (20-8) = x = 85 \times 12 = x = 1020$ grammes.

The indications that a sufficient amount of proper nourishment is being given are found in the increase of weight and in the function and general appearance of the bowels. The weight curve in healthy breast babies shows greater regularity than any form of artificial feeding. There are no abrupt changes either in loss or gain. A weekly increase in weight of 150-200 grammes is sufficient for the first few months. As the child grows older the weekly increase in weight diminishes. The body of the infant should show a uniform development without any disproportionate increase in the amount of fat. The pale, waxy hue of the fat, flabby body of the overfed breast baby is an evident sign of ill health. The bowels should be evacuated spontaneously several times a day. Provided the movements are normal they may be even more frequent in a healthy breast baby. The normal breast stool has a characteristic and sour odor entirely different from the usually fetid odor of the cow milk stool. The color is golden yellow and the consistency is seldom the ideal homogeneous but is usually thinner and contains small clumps. The reaction is invariably acid. Chemically it is poorer in organic phosphorus than the cow milk stool. Bacteriologically one finds Gram-staining acidophilous bacteria in almost pure culture. A greenish, clumpy, mildly dyspeptic stool resembling the early colostrum stools may return at any time during lactation in consequence of some gastro-intestinal disturbance. Constipation easily occurs in overfed breast babies and also in underfed breast babies on account of the almost complete absorption of the mothers' milk (pseudo-constipation of Czerny.)

An infant receiving sufficient food urinates frequently because the amount of urine should equal from 60 to 70 per cent. of the milk consumed if the proper amount of nourishment is taken.

Before considering the question of weaning it might be well to discuss briefly the nourishment and hygiene of the mother. This is generally regarded by both the physician and the laity as a most important question. Formerly a great many things were forbidden and a strict diet prescribed. A nursing mother was urged to take gruels, large quantities of milk and foods rich in carbohydrates. Beer was and still is considered by many people as an indispensable factor in producing an adequate amount of milk. Fish, game, fatty goods, salad, fruit and many other things were forbidden. To-day, however, we do not conform to a narrow diet. Schlossmann has shown that a nursing woman should be allowed to eat whatever she wants provided it does not disturb her digestion. He claims that monotonous over-filling is unnecessary and results only in spoiling the mother's appetite and thereby impairing her health and efficiency. The nursing mother should observe a certain caution in taking spices, acids and other things transmittable through the milk. She should also abstain from the much vaunted beer and other alcoholic beverages. Schlossmann, who is one of our first authorities, supports this opinion. These beverages in no way tend to increase the quantity of milk secreted. Their only action is dependent upon a possible increase in blood pressure but the same goal is reached by exercise, fresh air and the ingestion of large quantities of otherwise harmless fluids. As to the question of lactagogues, many of these are on the market and the manufacturers and druggists loudly proclaim their powers. I consider them all superfluous and many have not even the advantage of being harmless. The best lactagogues are good hygiene and moderate exercise. The secretion of a liter of milk daily represents a considerable expenditure of energy on the part of the mother that must be compensated for. On this account while she need not give up her customary household duties, yet she must guard against over-exertion, exciting amusements, mental emotion, etc. Menstruation may possibly cause a slight restlessness or a light dyspepsia, but the baby should never be removed from the breast on this account. Neither menstruation nor a new conception are hindered by nursing a child although pregnancy may put an end to the nursing after a space of time.

The change to a mixed food should take place about the ninth

or tenth month. The practice of nursing after the tenth month and even into the first or second year is contrary to physiology. Milk after this time does not contain all the elements demanded by the rapidly growing organism. As an illustration I need only mention the lack of iron in mother's milk as shown by the investigation of Bunge. The eruption of the first teeth between the fifth and sixth month is no indication for weaning. The mechanism of suckling prevents biting and only when the infant does not receive enough nourishment does he show his teeth. The weaning should take place gradually. Sudden weaning is associated with some danger to the infant and moreover until it is ascertained that the artificial food agrees with the infant, the breast milk should not be entirely withdrawn. This is termed "allaitement mixté." We have already spoken of the advantages of this method. Where the secretion of milk is insufficient, when it is necessary to cover a temporary deficit in the amount of milk, where the occupation of the mother prevents her nursing at certain periods of the day, where there are twins and the demand upon the breasts is excessive—in all these cases this method is indispensable. It can be carried out in two different ways. The infant can receive some artificial food at each nursing, in which case it is mixed with breast milk in the stomach. The best way, however, is where some of the feedings are entirely replaced by the artificial food. The substitution should go on slowly and the weight and stools be carefully observed. When the number of breast feedings has been reduced to two, one can proceed more quickly on account of the danger of the milk drying up and the colostrum bodies reappearing.

I prefer for the mixed feeding and later artificial feeding a mixture of cow's milk and a 10 or 15 per cent. solution of Soxhlet's Nährzucker (dextrin, malt and lactose slightly acidified). The proportion of milk is slowly and carefully increased. Broths and cereals can be added to the diet when the child reaches the age of physiological weaning.

I will not dwell upon the question of wet nurses as I know that they are not so favorably received in America as with us. It seems to me better that an unmarried woman should use her nursing capability for the benefit of others than to allow it to dry

up unused under the pressure of her social condition. It would be better for her and for her child. The same general rules apply to wet nurses as to mothers.

I have outlined a few of the more important features of breast feeding as regards a normal healthy baby. There is little further to be said about the nourishment of sick infants than that demanded by the pathology and therapy of the disease. It is important to bear in mind two things: first, that the lives of many weak, atrophic, premature, syphilitic, etc., infants can be saved by breast milk; second, that in severe gastro-intestinal disturbances of breast babies it is seldom necessary to stop nursing or to change the diet except to reduce the quantity. In many cases of gastro-intestinal disease in artificially fed infants the best medicine is breast milk.

In conclusion I would again state that there is no satisfactory substitute for breast milk. Perseverance, intelligence and patience, however, will enable many more women to give their children, at least partially, the benefits of mother's milk. Every woman, where no contraindications exist should attempt to fulfil this great duty.

The exercise of this function will tend to improve the nursing ability of generations to follow. By its more general use one of the chief causes of the high infant mortality will be removed and the health and strength of the oncoming babies will be improved, and we will fulfil the demand of Rosseau "*retourner à la nature.*"

WHEN AND HOW TO WEAN THE BABY.*

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The object of this paper is to consider the necessity for a more careful study of that change in the dietary of an infant which so often, when made at the wrong time and in an injudicious manner, leads to sickness then or lays the foundation for more sickness at some future date. A glance at the vital statistics of any city or county shows such an enormously large proportion of deaths during the first year, the time when nearly all infants are weaned, that we are compelled to ask the question, "Is this high rate of mortality in any way due to weaning, is it avoidable, and if so, how can we avoid it?" Vital statistics show us that one infant out of every five dies during the first year and that one out of every three dies during the first five years.

As the great majority of deaths are preceded by sickness, it is reasonable to suppose that the nature of the sickness incident to children during the first year might form some clue to this great mortality. When we consider the causes of death among infants at this age, we find that two-thirds of the deaths are traceable to acute or long-continued disturbances of the digestive organs.

If we remember that the weaning period is the one most likely to test a mother's knowledge of human milk and infantile foods and ability to apply this knowledge, and also that period which shows clearly the infant's power to digest foods other than human milk, we realize that a great portion of this two-thirds mortality rate during the first year must be due to the necessity of early weaning or owe its beginning to errors committed then. The experience of physicians corroborates this view. Mothers who thoroughly understand how to wean a baby safely very seldom commit serious errors in feeding their infants afterwards, and

* Read before the Wayne County Medical Society, Detroit, Mich., Dec. 5, 1904.

consequently, contribute very little to the high two-thirds proportion of infants' first year mortality.

That we may understand the importance of this subject, let us look at the number of deaths tabulated by the Health Board of the State of Michigan. Excluding all still-born infants, in the year 1890, there were 6542 deaths recorded of children under one year old. Two-thirds of this number shows 4361 deaths in Michigan in 1890 due to digestive disturbances and their results, the great majority of which could be avoided if the mothers of these infants weaned them at the proper time, used the correct foods and gave only the proper quantities of them. In other words, if the mothers knew the correct time and way to feed their infants when weaning them, over four thousand lives would be saved yearly in this State and all this saving of lives would occur among infants less than one year old. How many more could be saved during the second and later years by using a correct dietary, it is impossible to state.

If we look a little closer home and examine the mortality statistics of our own city, Detroit, we see a correspondingly striking result. In the fiscal year ending June 30, 1903, there were 1187 deaths of infants under one year old, and 1167 deaths in the same year from all causes among all our citizens between one and thirty years of age. This shows that if we separate those of the first year and then average these 1167 deaths over the different ages from one to thirty years, we have in that year more than twenty-nine deaths of infants under one year old for each death at 2, 3, 4, 5, or any age between one and thirty.

Nearly all our epidemic diseases occur in individuals over one and under thirty years old, and our health officers are mostly occupied in caring for the families of those suffering from these diseases and preventing all others from contracting them. Is it not a striking commentary on our christianity and civilization that we establish health offices, employ special sanitary officers and equip them with all the needed trained assistants and appliances at heavy cost to the public in order to avoid half a dozen funerals from small-pox and perhaps fifty from scarlet fever or diphtheria while we look complacently and indifferently at our hearses while they carry each year nearly twelve hundred of our little babies to their early graves? For these hundreds that die from the results

of an unsuitable dietary, we instruct our health officers to give death certificates as rapidly as they are demanded but do not empower them in any way to lessen this number.

For the very limited number who die of epidemic diseases, we hold our health officers largely responsible and expect them to put forth every effort possible to limit or lessen their number. A sordid view of the situation we occupy on this subject would, to an outsider, appear that we valued the lives of adults and every child above one year old away up in the tens of thousands and each one below one year old away down below the tens in cents.

All physicians deplore this distressing and heartless public position which we and all other cities and countries occupy on this vital question. Reading the sentiments of humanity by their public acts, it would appear that unless adults are afraid of contracting some loathsome or dangerous disease themselves or having their business injured by the fear of an epidemic, they will not make any unusual effort to save the lives of their children. Only by the generosity of a few wealthy individuals in a few of our large cities who have distributed free milk of a reliable quality to those who could not afford to buy it for their infants in the hot summer weather, has any effort been made to prevent this alarming summer mortality. As states, cities, or smaller municipalities, we have made no legislative efforts to check this enormous mortality from which the country suffers.

If we apply the mortality results in the State of Michigan, with its two and a half millions of people to the eighty millions of people in the whole country, we find an annual death rate of one hundred and thirty-nine thousand yearly under one year old which could be mostly avoided by educating our mothers to a greater knowledge in weaning and consequently in feeding and nourishing the human family.

RIGHT AND WRONG TIME FOR WEANING.

The proper time to wean an infant is when its nutrition is at the highest point which its mother's nourishment or that of a wet-nurse can produce. This may apply to any age, from the newborn infant to the one about a year old. While in this condition, is the time when all the digestive glands are healthy. There is no fixed age or suitable season of the year in which to wean if

the work is done properly. With the very moderate knowledge of mothers regarding the kinds of foods suitable to use at this time, the proper amounts to be fed at each meal and also during every twenty-four hours, physicians consider it prudent, if possible, to avoid making this change during hot weather when all animal foods are prone to rapid decomposition and the infantile digestive power is less vigorous than in the colder weather. Aside from these two factors, weaning is suitable at any season when the nutrition of the infant demands it. It is much safer to effect it in hot weather than to wait for a cooler season if the food now being given is reducing the weight of the child. The age of the infant must not be a factor in deciding this question, for where it is allowed to interfere, the digestive power of the infant is usually so much damaged by waiting that successful feeding thereafter is rendered much more difficult to accomplish.

WHAT MUST GUIDE US IN DECIDING WHEN TO WEAN.

There is no infant so successful as the happy one. Only in this condition do we see proof of the right quality and quantity of the daily aliment. This result can be obtained only by a milk which carries that proportion of fat, proteids, sugar and salts suited to the digestive secretions of that infant.

All mothers are subject to temporary and physical changes during the nursing period. These may show in many ways as acute sickness, menstruation, mental shocks, severe mental strain or unusual physical labor. Any one of these is capable of disturbing the milk secreting equilibrium while it lasts and the inevitable result is unsuitable proportion in the amounts of the fat, proteids, sugar and salts in the infant's food. This always causes a temporary indigestion, as shown by colic, restlessness, disturbed sleep, crying, loose mucus stools, vomiting or foul gassy discharges. Nature has made compensation for these disturbances by giving increased capacity in the different digestive glands to meet temporary emergencies until the improved condition of the mother restores the quality of her milk, after which the infant again becomes happy. During this disturbance, the child either loses weight or fails to make any increase, but these disturbances do not demand weaning.

In the regular female cyclic habit of menstruation, pregnancy or nursing, the time arrives sooner or later when a mother's milk

fails either in the quality or quantity. As this comes to all mothers at some time, it behooves us to be on the alert for this change and promptly wean the infant while it is yet healthy and its digestion uninjured. This should always be accomplished before any damage has been done to its digestive glands by trying to digest a milk which is not nutritious, but on the contrary is so irritating and injurious that its use soon injures the digestive glands and prevents or delays the growth of the infant or causes serious sickness. Every change in the infant is quickly recognized by the mother, and when she realizes fully the necessity of weaning promptly in order to secure good digestion and steady growth in her infant, she seldom hesitates in doing it.

The first evidence of unsuitable milk presented by the child is a failure to increase in weight. For many days or even weeks, this may precede the vomiting, foul, slimy green stools, poor sleep, pale face and irritable disposition, caused by this change in food.

It is the duty of every physician to educate the mothers in his charge up to that standard on this subject which protects them against their own foolish and selfish desire to continue nursing an irritating and poisonous milk, and also against the ignorant, though kind advices of their many women friends, who too frequently attribute all disturbances in the infant to teething, whether they occur during the first or the twelfth month of the infant's life. To this foolish, parrot-like advice may be credited the sickness of thousands and the deaths of hundreds in every large city each year.

All mothers should be taught the following facts,—

1. A nursing infant must increase steadily in weight. Failure to do this shows that the milk is insufficient in amount or wrong in quality.

2. When the milk is deficient in amount but contains the proper proportions of good fat, proteids, sugars and salts, the stools are correct in quality but small in size. The infant is hungry all the time and loses weight until it receives more food.

3. When the proportions or quality of fat, proteids, sugar and salts in the milk are unsuited to the infant's digestive secretions, they cause vomiting and green or mixed colored frequent mucus stools. These infants are cross, pale, sleepless, colicky and crying most of the time. They steadily lose weight while the

stools are of the above characters and unless the latter very soon become a healthy yellow color, it is necessary to wean the infant in order to avoid damaging its digestive glands or causing its death.

The difficulties which are encountered in feeding these infants who have been improperly nursed for a few weeks are frequently very great. This strongly applies to errors made during the first six months. Quite frequently, the power to digest fat, proteid or sugar has been so diminished in this way that one or other of these foods has to be almost eliminated from the substitute dietary before the infant can become comfortable and increase in weight. Many weeks or months of such a light dietary as will give healthy stools are required to repair the damage caused by such unsuitable human milk.

All infants should be weaned under the following conditions:

1. If the mother shows tuberculosis or any chronic ailment by which she is steadily losing weight, her milk will deteriorate in quality, and aside from the fear of transmitting the affection to the child, it is injudicious to continue nursing it, as it does not nourish sufficiently.

2. In attacks of typhoid, diphtheria or any contagious disease in the mother, it becomes necessary to remove the child immediately to avoid contagion by contact. Aside from this influence, it is unsafe to feed the milk from any contagious source. It is unfortunate that these contagious causes demand sudden weaning rather than the gradual way, which is always the safest and most desirable method.

3. Many infants are seriously, and some irretrievably, injured by nursing their mothers during the first few days or weeks of life while she is suffering from some febrile affection due to a septic cause. This may be uterine or mammary in origin, but the result on the infant is always the same. The restlessness, colic, lost sleep and frequent green mucus stools, with consequent loss of flesh, prove the impossibility to nourish an infant with food from the septic source.

4. There are many mothers who make a perfect convalescence from labor and have plenty of milk, yet their infants show continually frequent green mucus stools with little, if any, yellow color. Either the milk is wrong in quality or the digestive glands of the

infant are so imperfectly developed that they cannot digest it. This occurs commonly with the inherited syphilitics, and many demand weaning if specific treatment of the mother does not quickly correct the error.

5. Other children are born to mothers who make an uninterrupted recovery from labor, yet have so little milk that their infants starve more or less from the beginning. These mothers cannot realize that they have not the quality needed, even though the infant continues to nurse them fifteen to twenty minutes each time, nor yet can they see the fault when the stools are deficient in amount. Many of these infants will also have small green ropy stools all the time and yet their mothers, through ignorance, will persist in nursing, though the infants are becoming poorer every day.

6. Occasionally we find an infant six to ten days old suffering continually from hunger, colic and green stools, who, in addition to these distressing symptoms, has a thick pustular eruption covering most of the limbs and body and due entirely to the poisonous character of the mother's milk or unsuitability of the additional food which is given to the little one. This eruption is not born with the infant, but usually commences to show on the fourth or fifth day about the neck and nates. There is no possibility of continuing that diet which produces this intense dermatitis, and death will surely follow unless a correct dietary is quickly adopted.

The above cases show some of the more frequent conditions which demand immediate weaning of infants at different ages.

HOW TO WEAN AN INFANT.

The process of weaning may be either a physiological or a pathological act, according to the way in which it is done. In any physiological act, the organ used must be healthy and the work demanded must be such as can be done without irritating that organ. This always means that it causes no discomfort to the child.

From this foundation it is evident that all weaning should be done, if possible, while the alimentary tract remains in a perfectly physiological state—that means before unsuitable or pathological human milk has changed any part of it into a pathological condition. Early weaning is then demanded where pathological results show that it is necessary.

It is well known that it always becomes easier to wean an infant as it grows older. This means that all foods are pathological to the infantile digestive glands of the newborn infant except good human milk, and that the increasing number and more thoroughly developed condition of these glands as the infant becomes older gradually renders foreign foods less pathological and difficult to digest and weaning a more physiological process. With these facts as a guide, the undesirability of weaning increases in inverse ratio with the age of the infant.

To do physiological weaning demands an acute knowledge of the natural digestive plan. This, of course, means to know what foods and how much of them are needed at each meal and during every twenty-four hours for infants of different ages and sizes.

Physiological weaning in a pathological digestive tract is certainly more difficult than in a perfectly healthy tract. This argues the following facts: (1) We should always be interested in retaining the natural physiological conditions of digestion; (2) we should give the infant's food our careful attention; (3) we should educate mothers how to do perfect nursing, and failing in that (4) we should teach them how to substitute feeding.

The principles which rule in weaning an infant vary at different ages. The very young infant digests the foreign fat and sugar very well, but he has little capacity for digesting the proteids and starches. After the first month, the proteids can be gradually increased, and after the third month starches can be gradually added to the dietary. Care must always be taken to reduce the sugary diet as the starchy one is increased, as both are digested by the same glands. These general rules are applicable to weaning infants before they have been injured by continuing to nurse unsuitable mother's milk; in other words, to do physiological weaning as perfectly as it can be done with a non-physiological food. In direct proportion with the severity of the pathological condition in the digestive glands will always be the difficulties encountered in weaning an infant. In some, this pathological condition has been advanced so far that there are not enough healthy digestive glands left to convert the amount of food required to nourish that number of pounds which the infant weighs. Such infants always lose a little more every day until death ends the struggle.

Where enough healthy digestive glands are still remaining with

which to nourish the infant, a physiological use of them is absolutely necessary for success. As physiological use always means a comfortable infant, it is plain that only those amounts of fat, proteids, sugar and salts must be fed which can be perfectly digested at each meal and thus secure a happy baby and comfortable sleep. If we can obtain these foods from a suitable human milk, the work is physiological and much simplified, but if we are compelled to take them from cow's milk, which, to the human stomach for the first many months, is a pathological source, the work is rendered very much more difficult.

The main idea then in perfect weaning is to keep the digestive glands working in a physiological or comfortable way, knowing that their use in this way strengthens those present and develops more of them, while the pathological or distressing use of them not only injures those that are present, but retards the growth of new ones. To secure this result, all new foods must be commenced in small quantities and increased only as rapidly as comfortable digestion and healthy stools will allow. Usually, the amount of food suitable to an infant two or three months younger is enough to commence with.

No infant should be weaned suddenly unless the exigencies of the situation demand it. If possible, at least two weeks should be consumed in making the change. This will allow one meal to be changed each day, and one or even two days may intervene to prove the correctness of the new food. In this way, only small mistakes can occur and little damage be done to the digestive tract.

The importance of this subject demands that physicians should themselves examine the stools carefully of all cross colicky babies and instruct the mothers regarding the dangers of continuing to nurse the infant when its stools are not correct in color, consistence and number. Many infants are lost during the first month or two through the ignorance of mothers on this vital point.

The mother who is thoroughly educated up to the importance of avoiding green mucus or watery stools in her infant as a security against most of its sicknesses during the first year, has the best prospect possible of seeing that infant grow steadily and become perfectly developed. When she always has this principle as her guide in dieting her offspring of all ages, both in health and sickness, she becomes an almost impregnable barrier against most

infantile sicknesses of all kinds. If the day ever comes when physicians have educated the mothers up to this requisite standard of knowledge, then we shall not see more deaths during the first year than we shall see of all ages between one and thirty years, and the prospect will be that the one hundred and fifty thousand infants who die annually from improper feeding in this country would be reduced to a fraction of this number.

RELATION OF FEEDING TO INFANT MORTALITY.*

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One of the most important problems of pediatrics, which in spite of all efforts and researches still remain unsolved, is infant feeding. About twenty-five years ago it was believed that the constituents of different milks were the same, but existed in different proportions. The problem of infant feeding then was regarded easy to handle. But all the efforts to render cow's milk, the substitute milk generally used for artificial feeding, equivalent to human milk, by reducing its amount of albumen, increasing its sugar, etc., to the same proportion as in the human milk, have been proven useless; the result has not been better. Physiological researches explained the difficulty; the constituents of human milk differed not only in proportions, but also in physiological qualities. If we consider the different rates of growth, the different dominant tissues in the organism, the different digestive systems of an infant and a calf, we must without hesitation admit that the food designed for the infancy of these two different animals should be physiologically different.

A calf as soon as born can stand and run, and in a short time has no need of the food which is furnished from its own mother; while an infant is born helpless, and needs care and maternal food for a long time. The stomach of a cow comprises 70 per cent. of the whole digestive tract, while the human stomach comprises only 20 per cent. of the same. (H. D. Chapin.) The infant stomach does not form a depot. It is adapted to receive only a small quantity; the food therefore should be of easy digestion, and leave the stomach in a short time. The capacity of the stomach of an infant the first month is 90 gms. (3 ounces), and enlarges only three-quarters or half of an ounce every month until one year of age. If we take the capacity of an infant stomach in weight, it is 1-60 of the entire body at birth, 1-40 at the end of the first month, 1-33 at the end of a year, 1-23 in an adult (Biedert.)

* Read before the Utah State Medical Association, Ogden, Utah, May 10 and 11, 1904.

In the process of digestion and assimilation the cells of the digestive system are active automatically, their secretion and functions are adapted to the food which nature from generation to generation has consigned to them. The cells of the calf's digestive tract should be endowed also with different functions, and should be constructed differently from those of an infant's to assist the digestion of the food of their own race. As statistical tables illustrate, an infant deprived of its natural food is unfavorably situated to maintain its existence, on account of lack of proper food, the food that should correspond to its digestive power and to the need of its constitution.

Statistics of 1830 to 1850 represent an average 188.3 per thousand infant mortality, among infants under one year of age. Statistics of the years from 1870 to 1890, in spite of all the progress in dietetic hygiene, show an increase, 194.4 per thousand (Bertillon). Eroess' statistics of the years 1886 to 1890, made in twelve different countries, among infants under one year of age, present 188.8 per thousand mortality. There were 7,708,000 deaths to 40,833,000 births. If statistics of Russia be added to this the average rises to 214.7 per thousand. Children under fifteen years of age make up one-third, children under five, one-ninth of all the population; so the above mortality comprises one-fourth of entire mortality. In England in the first month of life the infant mortality is 570 per thousand, deaths resulting from congenital diseases, malformation, weakness, injuries during the labor, etc., included. In the second and third months, etc., it decreases gradually to 218, 157, 131, 126, 120, 115, 110, 105, 100, 95, and 90 per thousand at the twelfth month. In New York, according to the statistics quoted by L. Fisher, in the three years, 1890 to 1892, there were 162,721 births. During that time the number of deaths of children under five years of age was 52,213, making the death rate over 320 per thousand. According to Holt in three years, 1890-92 inclusive, the total mortality was 128,136, distributed among the different ages as follow:

Under one year.....	32,916—26 per cent.
1— 2 years.....	10,547— 8 per cent.
2— 5 years.....	9,794— 7 per cent.
5—15 years.....	69,409—54 per cent.

According to Quetelet, quoted by J. L. Smith, there die during the first month after birth four times as many children as during the second month after birth, and almost as many children as during the entire two years after the first year, although even then the mortality is high. Tables of mortality prove, in fact, that one-tenth of the children born die before the first month has been completed.

Infant mortality increases with the increase of the births (Biedert). In Copenhagen in 1880, in families with 1—4 children the mortality was 226 per thousand; with 5—8 children, 302 per thousand; with 9—12 children, 495 per thousand. Schweig gives the following report in this respect from the province of Baden; if the births were 21 per thousand of the entire population, the deaths of infants, under one year of age, were 21 per thousand of the entire mortality; if the former was increased to 25, 36, 53 per thousand the mortality increased to 22, 27, 26 per thousand of the whole.

Illegitimate infants in all countries present the highest mortality, on account of lack of maternal food and care. Bertillon says: "It is a crime. One has no courage to kill the infant, but one lets it die gradually by starvation and neglect." Statistics of the years 1881-85 and 1890-95, collected in five different European countries, presented a mortality of 310 per thousand, against a mortality of 185 per thousand among legitimate infants of the same age. Majer gives from 600 to 750 per thousand mortality among the illegitimate infants of some Bavarian districts.

Nearly the same condition prevails among infants whose mothers are obliged to work out of their houses. Villerme pointed out, that during the years 1823-24 half of the children of merchants, manufacturers, and engineers reached the age of twenty-nine years, while half of the children of women working in textile industries and living in the same districts, died before having reached their second year. Nearly the same condition prevails in all European manufacturing districts.

Among infants of the poor classes the mortality is likewise higher. In Berlin, Germany, among the children of the rich classes, under five years old, the mortality is 57 per thousand; that among the poor classes is 357 per thousand, about seven times as much. Clay has pointed out that in Preston at the end of the

first year, of 100 infants of gentry, born alive, 90 were living; that of merchants 79, and of the laboring classes only 69. Wolf gives the following statistics from Erfurt. Out of a thousand infants born alive the mortality may be tabulated as follows:

<i>Age.</i>	<i>Illegitimate.</i>	<i>Laboring Class.</i>	<i>Middle Class.</i>	<i>High Class.</i>
Under one year.....	352	305	175	89
1—2 years.....	55	115	55	19
3—5 years.....	42	136	65	26

He further pointed out that, where one infant of the rich classes dies from gastro-intestinal diseases, from the middle and laboring classes 2—2½ die; from illegitimate infants, 7½. As an interesting fact in this regard it may be mentioned that in Erfurt, Germany, during the year 1851, in which the prices of victuals were low, infant mortality was 194 per thousand, while in the year 1855, when the prices of victuals were very high, the mortality increased to 249 per thousand. In Finland during the bad crop years of 1867 and 1868, the infant mortality was 220—390 per thousand, while the average mortality in the years 1865-66 and 1869-77 was 165 per thousand. (Biedert.) In all the large cities of the world, such as Rotterdam, Prague, St. Petersburg, New York, Berlin, Budapest, Breslau, Copenhagen, Chicago, etc., infant mortality is highest among the poor classes.

Among the inhabitants of the overcrowded districts of the large cities infant mortality is again highest. In Leipzig in the localities where there is one room to each infant, the mortality is 101.1 per thousand; in the localities where there is one room to 2—2½ infants, the mortality is 330.6 per thousand; it is 416.9 per thousand where there are three children to one room. In Vienna the lowest infant mortality, 141—232 per thousand, is in the districts where there is one room to 0.83-1.32 persons, while the mortality increases to 406—429 per thousand in the districts where there are 1.94—2.10 persons to one room. In this matter, according to Biedert, the chief acting factor is rather poverty than the unhygienic circumstances of the place, since among the relatively well-off laboring class, who live in unhygienic places, such as cellars, etc., infant mortality is lower than among the poorer classes who are living in relatively more healthy places.

During the year the maximum infant mortality is in the hot summer months. This is, however, caused mostly by spoiled and contaminated food, since food spoils easily in hot temperature. (Biedert.) In Prague, Austria, where every woman nurses her own infants, the hot summer season does not show any increase in infant mortality. In Berlin during the hot summer months infant mortality is twenty-one times greater among infants artificially fed than among breast-fed infants; the average through the whole year is only eleven times greater, and it reaches its climax in July, when the mortality of the artificially-fed infants is twenty-five times higher. According to Biedert's statistics from Hagenau, Germany, in the years 1885-90, 64 died of gastro-intestinal diseases in May, 89 in June, 129 in July, 182 in August, 251 in September, 182 in October. The average death in every month is 52. In France, of 12,000 deaths among infants under one year of age, 5660 (about 50 per cent.), happen in the four summer months, beginning with July. In Berlin, in the districts where the poor classes live, the summer months show five times greater mortality among infants under one year of age than in the other districts.

Deaths by gastro-intestinal disturbances, called by laymen, cramps, teething, convulsions, weakness, etc., according to Biedert, comprise the 100—530 per thousand of the infant mortality. A reliable report from Wolf shows 600 per thousand of infant mortality in Erfurt. C. Meyer gives the following statistics from the district of Allerhausen, where the diagnoses were made by the physician. Seven hundred and ten out of 1000 infant deaths were from gastro-intestinal diseases, 50—280 out of 1000 deaths from diseases of respiratory organs, 70—240 out of 1000 deaths from infectious diseases. He further points out that in Bavaria, the higher infant mortality is, the higher is the percentage of deaths from gastro-intestinal disturbances.

In all countries the mortality among the artificially-fed infants is high. Bertillon reports from Loire Inferieur, 900 per thousand mortality among artificially-fed infants under one year of age. In whole districts, out of 100 deaths in infancy, as examination showed, only eleven were breast-fed during life. Of 1943 fatal cases from digestive disturbances, collected by Holt, only 3 per cent. had the breast exclusively. He says: "In my own experience,

fatal cases of diarrheal diseases in nursing infants are extremely rare." Smith quotes the following: "On the continent, in Lyons and Parthenay, where foundlings are wet-nursed almost from the time that they are received, the deaths are 337—350 per thousand. On the other hand, in Paris, Rheims and Aix, where foundlings are all artificially fed, at the date of the statistics, their deaths were 502,639—800 per thousand." He further states that, "In New York foundlings, numbering several hundred a year, were formerly artificially fed, and, incredible as it may appear, their mortality with this mode of alimentation reached nearly 100 per cent. Now wet-nurses are employed for a portion of the foundlings, with a much more favorable result." Holt says: "In my own experience it is extremely rare to find a healthy child who has been artificially fed from the birth, who has been reared in a tenement house." He further says: "The largest number of deaths in the first year are due to diseases of the gastro-intestinal tract and marasmus." In Berlin the deaths among artificially fed infants in the years 1891-92 averaged 9.4 times more, and in the first seven months 11.4 times more than the deaths among the breast-fed infants.

We see from the above statistical facts that the greater the difficulty to procure a suitable food for the infants, deprived of their natural food, the higher the mortality rate. The circumstances not under the control of the mother, such as poverty, unhygienic buildings, inability to procure high-grade milk, and to follow directions in preparing and preserving it on account of the number of children in the family, or occupation out of the house; and again, the ignorance and negligence on the part of the mother or nurse combine to produce the "race suicide" of our civilization. It sounds incredible that a healthy born infant should die from lack of proper food. The old master, Hippocrates, said: "Food is not food, if it does not nourish." The food for the use of infants should repair the waste, supply material to build up new tissue, and furnish force and heat for the functions of the organism.

At the present time the general substitute food for human milk is cow's milk; it can be procured everywhere and is within the reach of all. There has not been produced, however, yet, a standard modification of cow's milk which would correspond to

the need of the infantile organism, and be adapted to the power of its digestive system. As I mentioned in the beginning briefly, human milk and cow's milk,—judging from pure reasoning and also scientific facts,—should be differently compounded bodies, to correspond to the different rates of growth, to different capacity of the digestive systems, and to different proportions of the animal tissues in the organism of their offsprings.

In the first place the ingredients of cow's milk, the albuminoids, the fat, the sugar, etc., represent different proportions from those of the human milk; of albuminoids cow's milk contains 3.55 per cent., the human milk 1.50 per cent.,—about three times more; of fat both milks contain about equal parts,—cow's milk 3.69 per cent., and the human milk 3.30 per cent. The human milk contains about twice as much sugar (6.8 per cent.) as the cow's milk, which contains 4.8 per cent.; of inorganic salts cow's milk contains 0.70 per cent., the human milk 0.20 per cent.,—about three times more.

By these chemical facts, however, the question of how to modify the cow's milk for the use of infant feeding is not wholly finished. The most important matter, the utilization of its ingredients in the economy of infantile organism, remains yet for the researches of the future. Chapin says: "It is useless to attack the problem of artificial infant feeding from the standpoint of chemistry alone, although a knowledge of food chemistry is of great importance. What is needed is a knowledge of substances that have proven to be able to support life and produce healthy tissue; how to combine and adapt them to suit the needs and the digestive system of the infant."

One of the most important ingredients of the milk which is utilized in the organism of the infant to repair the waste and supply materials to build up new tissues, is the albumen. The fat and the sugar are partially used, if necessity arises in the household of the organism, as substitutes for the albumen, but they are mostly used as force and heat producers. Biedert sees the most important differences in both milks in the albumen. He says: "I observed closely ten years the breast-fed infants and also the infants who were fed with cow's milk or with other infant foods, and I always noticed a great difference in the condition of health and growth, and in their stools. One must keep

always in mind that from the unyielding cow's milk *casein* should be given as much as it can be borne by the infants." In the following I wish to point out some of the important facts in regard to the difference of albumen in both these milks.

As we know from physiology, the albumen transforms into *peptone*, a soluble compound, by the action of the stomach juice. Milk curds in the stomach before it can be changed into peptone by the presence of a *lab-ferment*, *parachymosin*. The *lab-ferment* of human stomachs, *parachymosin*, is a far more susceptible body than the *chymosin* of calf's stomach; the former loses its curd-forming power by adding alkalis, or by heating, to a greater extent than does the calf's *chymosin*.

By adding a small quantity of fresh human stomach juice to human milk there form curds, and by adding to this sufficient stomach juice, to equal in quantity the milk, the curds formed will be dissolved completely. In contradistinction to this, the curdling formed by the addition of fresh human stomach juice to cow's milk remains the same, no matter how much of stomach juice is added. According to Bruecke, different kinds of albuminoids demand various amounts of pepsin; albuminoids of human milk require relatively the less quantity. Among the different albuminoids, fibrin, legumin, etc., the caseins are easiest to digest. The fat, which is suspended in the milk as microscopic drops, is embedded in the meshes of the curds, and makes them very loose and flocculent. Human milk containing relatively small amounts of albumen and large quantities of fat divides its curds in the finest flakes. The attempts, however, to render the curd of cow's milk as fine as that of the human milk, by diluting to 2:1, 1:1, 1:2 with water, or adding different agents, such as soda chloride, soda carbonate, or coagulating the milk first and shaking it to fine particles, etc., have been proven useless. (Vogel, Kuttner.)

One of the chief characteristics of the cow's milk *casein* is that it curds in the acids, while the human milk *casein* remains unchanged. According to Biedert's experiments, in alcohol and in tannic acid both caseins were equal in chemical changes. In the following agents, 0.4 per cent. or concentrated hydrochloric, nitric, sulphuric, and phosphoric acids, 20 times diluted or concentrated lactic, acetic, tartaric acids, in calcium chlorate, magnesium sulphate, lead acetate, bichloride of mercury, human milk is never

or with great difficulty curdled. On the contrary, in these reagents the curds of human milk dissolve; with these reagents the cow's milk casein curdles and remains so.

Beside the consistency, both caseins differ in their color and reactions. Human casein is light yellow when it is wet, brown when it is dry, the cow's milk casein is white when it is wet, light yellow when it is dry. When they are wet the reaction of the human casein is alkaline, that of cow's milk casein is acid. Only 1-20 part of the dried and powdered cow's casein is soluble in pure water, while with human casein the great part could be dissolved. During the extraction of fat in ether, the human casein swells and turns jelly like, and makes its separation impossible, while the cow's milk casein remains unchanged.

According to Reichmann's and Escherich's observations no albumen of the human milk passes the infant stomach without being digested. Van Putrin proved that the digestion in the stomach of breast-fed infants takes place relatively in short time. Nearly always the stomachs of breast-fed infants were entirely empty in 2-2, 1-3 hours after the feeding, while those of cow's milk-fed infants were found empty in 2-3 hours or longer. Biedert proved that the stomachs of the breast-fed infants were always empty in 2 1-3 hours after the feeding, and according to forty-six examinations of three cow's milk-fed infants—1½, 5, and 6 months of age,—made in 2¼, 2½, 2¾, and 3 hours intervals after the feeding, it was found that the stomach was entirely empty, in three hours, two times; thirty-two times there were yet undigested curds in different quantities, two times there was yet a great amount of the curds. According to C. Bernard, the rest of the albumen, which passes the stomach undigested, is digested in the lower part of the intestines, by the action of the pancreatic juice. The action of the pancreatic juice, however, is impaired in the acid reaction of the contents. The breast-fed infants are protected against this by the complete digestion of the albumen in their stomach. When the infant grows older the quantity of the pancreatic juice becomes larger and it meets the undigested albumen in the lower part of the intestines, where the reaction becomes more alkaline. But in the lower part of the intestines there is great danger that the undigested albumen will fall a prey to the decomposing micro-organism.

Escherich found the micro-organisms in the contents of the intestines of new-born infants, 3-7 hours after the first respiration; they are carried by the air first to the mouth and from there to the digestive canal. After the first feeding which drives out the congenital contents of the intestines the predominant micro-organisms are *bacterium lactis aërogenis* in the upper part, and *bacterium coli communis* in the lower part of the digestive tract. *Bacterium lactis* transforms the milk-sugar into lactic acid, carbon dioxide, and hydrogen. *Bacterium coli*, which can exist in every reaction, acid or alkaline, produces chiefly butyric acid from the neutral fats. (Biedert.)

By sterilizing foods the existence of the micro-organisms is not checked. Eberle found 32,000,000 micro-organisms in one milligram, about one-sixtieth of a grain, content of the intestines, in spite of sterilized food. Langermann found in one cubic centimeter, about half a cubic inch, content of the stomach of a normal digesting cow's milk-fed infant from 3700 to 240,000, in that of breast-fed infants, from 6900 to 29,000, and in that of a sick infant millions and millions of micro-organisms. In the presence of free hydrochloric acid, which has a germicidal property, still from 3200 to 6400 micro-organisms were found in the same amount of stomach content.

It is demonstrated that in cow's milk-fed infants there is always more or less putrid decomposition of the albumen in the intestines; even in well digesting and healthy cow's milk-fed infants the existence of putrid decomposition can be proven by the presence of *indican* in the urine. This is the reason why the stools of cow's milk-fed infants smell like rotten cheese. A. F. Marfan gives the origin of putrid decomposition "incomplete utilization of cow's milk casein." According to the examinations made of ten breast-fed and seventeen cow's milk-fed infants, the stools of the cow's milk-fed infants contain three times more N than those of breast-fed infants. If the amount of N which would originate from the gastro-intestinal secretions be abstracted, still two-thirds of the N would originate from unutilized casein of cow's milk. Breast-fed infants are well protected against putrid decomposition by existence of the acids (hydrochloric, lactic, and butyric acids) and by complete digestion and assimilation of the albumen. The contents of the gastro-intestinal canal of breast-fed infants to the end of, and even after digestion, have acid reaction.

According to Wegscheider there is no remainder of casein in the stools of breast-fed infants.

Gentlemen, as we see from the above stated facts, from the standpoint of chemistry and physiology, the difficulty in artificial feeding, and the main cause of the gastro-intestinal disturbances of cow's milk-fed infants originate from the unyielding albumen of cow's milk. The future of the infant feeding depends to a great extent upon the adaptation and utilization of foreign albumen in the digestive system of infant.

But this, unfortunately, is not the only difficulty to be overcome to produce a proper infant food. One of the greatest of other difficulties is to produce and to supply wholesome cow's milk for the use of a large mass at a price that will put it within the reach of all. Bacteriological and chemical examination of milk, which is furnished as infant food, gives us an idea as to its unfitness for feeding. Prof. H. W. Conn, of Wesleyan University, states as follows, "The milk that is supplied to our cities frequently contains more bacteria than are present in city sewage, and in the case of unusually bad samples of milk the number of bacteria outnumbers that which is found in the worst sewage." If we consider only that one gram, fifteen grains, fresh soil contains 100,000,000 bacteria, and one gram cow's manure as many as 375,000,000 bacteria, and on a little scab of cow's udder and hairs exist several hundred of bacteria, and also if we consider that one single bacterium, in a temperature of body heat, in six hours increases to 3880 bacteria, we shall realize how easily a milk supply may be contaminated and how difficult is its handling. On the other hand the milk at home, after being delivered, is subject to farther contamination at the hands of ignorant and negligent mothers or nurses, by the bottle, nipples, spoons, strainer, etc. The bacteria not only by decomposition destroy the albuminoids of the milk, but also produce toxic elements, which act very injuriously on the general constitution and especially on the mucous membrane of the gastro-intestinal tract.

THE YEAR'S PROGRESS IN ORTHOPEDICS.*

BY NATHANIEL ALLISON, M.D., OF ST. LOUIS.

THE NON-TUBERCULOUS JOINT DISEASES.

For a number of years the medical mind has been dissatisfied with its understanding of the so-called rheumatoid diseases, a dissatisfaction which has increased by the knowledge that the nomenclature used gave no common ground on which to explain or exchange ideas. It is certain that very many different conditions have been called by the same name, and it is also certain that the same condition has been given very many different names. In order to establish some system in this chaos many have been working; the vast number of joint conditions known as the non-tubercular joint diseases have been grappled with on all sides; pathology, bacteriology, chemistry and the Roentgen rays have, on the whole, helped much, though at times their evidence has been contradictory. We must be rid of such terms as "chronic rheumatism" and "gout," used to designate affections varying from infection of a joint by the gonococcus to Heberden's nodes. During the last year much has been done in the way of putting forth knowledge accumulated in the clinic and laboratory during the last decade, and the number of articles, as well as the different fields of work represented by the authors, testify to the fact that the light is coming through; that after a few minor points are settled the work may go on aided by mutual interest and understanding.

Goldthwaite¹ divides the field into five types, and has given us the essential characteristics of each type; briefly they are as follows: The first, *the chronic villous arthritis*, or "dry joint." This is a local process with no tendency to progression, and is usually seen in the knee. Crepitation or cracking of the joint on motion, pain and tenderness on use, catching and even complete locking at times, with increase in the joint fluid, are the symptoms. The condition is the result of strain and weakness, the joint membranes become lax and congested, are thrown into folds, which, being rubbed over each other, become more swollen

* By courtesy of the editors of the Interstate Med. Journal.

and fringes or villi result; these in turn undergo fatty degeneration and lipomata are formed, or calcareous degeneration may take place and the bony or cartilaginous masses known as "joint mice" develop.

The second type, *atrophic arthritis*. The etiology of this type is not known; it is a progressive disease, resulting in marked crippling and distortion, in which the essential pathological feature is atrophy, an atrophy which involves the joint membranes, the cartilage and the bones. Many joints or only one may be involved; the disease may extend gradually for years. The finger joints are usually involved early in the course, and the middle row of phalangeal articulations is first affected, spindle-shaped swellings with pain and stiffness, resulting in distortion and ankylosis.

The third type, *hypertrophic arthritis*. In this class the bones are thickened, this thickening taking place at the edges of the articular cartilages or at the attachment of ligaments. The formation of ridges or nodes which become ossified and interfere with joint motion is the essential feature of this type. In the finger joints Heberden's nodes typify the process. It may be local or general; the spine is frequently the seat of the disease, and the fusing of the vertebræ and intervertebral discs may be so complete as to result in ankylosis. During the active or irritative stage of this condition pain of extreme and persistent character is present; it is usually referred pain, due to pressure on a nerve, such as sciatica, intercostal or brachial neuralgia. Exposure to cold, strain and injuries are undoubtedly factors of importance in the etiology of this type.

The fourth type, *infectious arthritis*. With this type of disease the symptoms are those of infection, varying in severity with the organism of infection. There is local inflammation, the joint is swollen, the capsules thicken, but there is no change in the cartilage or bone unless the process is of a destructive nature. The organism may be present in the joint, or as in the case of the typhoid bacillus, the joint process may consist of simply a toxemia. These cases may result in adhesions, weak, unsteady joints, or where the process is destructive there may be true bony ankylosis.

The fifth type, *chronic gout*. This is a rare disease, the path-

ology of which is little understood. The essential characteristics are the deposits of urate of soda in the soft structures about the joint, and some bone absorption adjacent to these deposits.

Here we have a definite field divided into five sections; the only difficulty remaining is to classify the individual case and place it in its proper square. That there may be difficulties in doing this is evidenced by the fact that Bradford² writes that where as yet we know nothing absolutely of the pathological process, he considers it better to use a single name for all these conditions—excepting, of course, infectious arthritis due to a known bacterial agent—and suggests as a name "*arthritis deformans*." He considers this name better, as it does not assume a pathological basis and does not prevent necessary subdivisions. He promises us a full report on a long series of autopsy findings in the near future; he is being aided in this work by E. H. Nichols.

McCrea,³ in an analysis of 170 cases, has gone over the pathology and etiology of arthritis deformans in a thorough manner and has made some interesting discoveries. As to the age of onset he found that in 70 per cent. the onset was before forty years of age, and that in 50 per cent. it was before the age of thirty. This is clearly against the idea that these joint affections are the lot of old age. He came to the conclusion also that there are two great types of cases, the atrophic and the hypertrophic, which are varying manifestations of the same disease.

Morse⁴ has written that in childhood the atrophic and the hypertrophic forms of arthritis are rarer than in adult life, as is shown by the literature, Koplik being able in 1895 to collect but eighteen cases, and Moncorvo, in 1901, but forty-eight cases. Undoubtedly many other forms of disease were included in their series of cases. The disease described by Still in 1896, and known as Still's disease, he classifies with infectious arthritis.

Poynton⁵ has shown us how confusing the lack of a definite nomenclature is; he calls attention to the fact that we need to simplify our terminology. It seems that this would apply more especially to English writers on this subject, for in the British journals the confusion is so great that it is difficult to get any definite impressions.

Though the pathology of these affections, as well as the etiol-

ogy of most of them, is still an unknown quantity, though many bridges must yet be built to carry us over differences of opinion, we have the comfort of realizing that the needed treatment has been made much clearer, and that the prognosis under treatment and without treatment is also clearer. Whatever ideas an individual may hold as to the scientific side of these cases, he must admit that the therapeutics have made a wonderful advance. Skinner,⁶ Goldthwaite and Kolipinski⁷ have written excellent papers on the treatment. It is to be hoped that the attention of the profession in general will continue to be directed toward these cases and that, as in the case of the kidney, we shall come to a thorough knowledge of the lesions down to all possible refinements, and that no longer such a term as "chronic rheumatism" will be applied to the many different diseases of the joints.

Chute⁸ has pointed out the importance of making a diagnosis of hypertrophic arthritis of the spine in cases of urinary disease; many patients with supposed hypochondriasis or neurasthenia have had cause for their pain, and have recovered when proper treatment has been applied to their spines.

CONGENITAL DISLOCATION OF THE HIP.

In order justly to criticize an operation having the character of the Lorenz operation for congenital dislocation of the hip, it is necessary that the element of time play a part. It has now been two years since the visit of Lorenz to this country, and during the last year reports of most of the cases that came under his hand have been given to the literature. Papers have been written which have called out the best opinion in America in animated discussion. Adverse and favorable criticism both have been unrestrainedly expressed. The Lorenz operation has been placed under a microscope, as it were, and examined carefully, and on the whole with fairness by those best able to appreciate its advantages and disadvantages. It would be strange if opinion were not affected by certain unpleasant characteristics of the tour of Lorenz through this country, but it is not evident in any of the critical discussions that have arisen on this subject that opinion has been materially influenced by personalities. The visit of Lorenz was the stimulus which has brought out the statistical reports and supplied us with the definite knowledge on this subject which was so much needed.

From the orthopedic staff of the Boston Children's Hospital^a has come a complete report of all the cases of congenital dislocation of the hip at that institution since it has been recognized that something could be done for these cases. This report covers a period from 1884 to the present time, and is based on the observation of 144 cases. It includes ten cases manipulated by Lorenz, and shows the results of all known methods of treatment. It shows, too, how success has added to success, and increased the field of usefulness of operation for this condition. Between the years 1884 and 1896 twenty-one cases were treated, seven by mechanical appliance without operation, twelve by open operation and curettage (Hoffa's early operations—two of them by Hoffa himself), and two by manipulation under an anesthetic. All twenty-one were failures. Between the years 1896 and 1902 fifty-four cases were operated upon; thirty-four of these were cut down upon with eleven successful, six unsuccessful and seventeen unknown results. Twenty were manipulated with one success, seven failures and twelve unknown results. In the year 1902 twenty-two cases came to operation, an excess of one over the entire number treated in the twelve years before 1896. Of these twenty-two, two were operated upon by an open incision and were both failures. The remaining twenty were manipulated, half of them by Lorenz himself. The results were eight successes, two failures, three relapses and seven transpositions. In the year 1903 thirty-three cases were operated upon. On twenty-four of these a machine was used to aid stretching. The results were sixteen successful cases, five transpositions and three failures. Eight cases were manipulated with six successes, one transposition and one failure. One case was operated upon by the open method and was a failure.

Enough time has elapsed to make these results trustworthy, and most of the cases have been verified by skiagrams and the careful examination of unprejudiced observers.

The gratifying improvement in results here noted needs no further comment. Attention may be called to the fact, however, that there has been a steady gain on the side of manipulative methods as against the open operation. The broad view of this subject taken by the group of men making this report is apparent in this paragraph taken therefrom: "There is a certain analogy

between the treatment of congenital dislocation of the hip and that of club-foot. In the simple cases manipulation under an anesthetic is sufficient. In the more resistant cases correction is helped by mechanical aids. In the oldest and most complicated cases incision and osteotomy are often needed to perfect the cure."

Bradford, by long years of patient energy and devotion to this branch of orthopedics, has been able to give to us with the aid of his associates this valuable epitome. The mechanical stretching referred to in this report was accomplished by the "Bartlett machine," or the "Boston machine," an instrument devised by Mr. Ralph Bartlett, an attorney. This machine is a powerful traction windlass, so constructed that its outside bar presses directly on trochanter major. With it powerful traction is applied, the limb is pulled down, then the machine is abducted with the limb and the head lifted directly into the acetabulum. Bradford¹⁰ attributes the success attained in many cases to this contrivance, and has published a description of it during the year.

Ridlon,¹¹ in an article on the ultimate results of the bloodless operation, has taken up the claim of Lorenz that 80 per cent. of the manipulated cases show good functional results and that over 50 per cent. of the cases show anatomic reposition, and states that the anatomic replacements are not in excess of 20 per cent., and that the claims of Lorenz have led to bitter disappointment and unjust condemnation of earnest and skilful operators. He also gives to Paci, of Pisa, the credit of originating the operation, and is apparently of the opinion that what Lorenz has added to the method of Paci is of little importance. His statements on percentage of success are based on the observation of 159 dislocated hips, ninety-four of which had undergone the manipulative treatment. Of these ninety-four ten showed perfect anatomic replacements. Lorenz himself operated upon twenty-nine of these with the following results, according to Ridlon's report: Seven failures, thirteen anterior transpositions, six supracotoid displacements and the remaining three doubtful successes. He accounts for this difference in results with the claimed results of Lorenz as being due to the conditions under which Lorenz operated, and also to the fact that most of the cases did not receive proper aftertreatment.

Lorenz¹² has written a paper which in part answers these criticisms, though he does not take up the discussion openly. He goes over the old ground, and states that he can see no way in which to improve his operation; that he does not approve of a machine to aid in stretching the contracted muscles; that too much importance should not be attached to the skiagrams of cases, for it is not uncommon for the skiagram to fail to coincide with functional results. He does not believe that the age limit can be raised, and closes his paper with the significant phrase, *nil perfectum sub sole*.

Mueller,¹³ the assistant of Lorenz when he travelled over the country, has taken up the statements of Ridlon openly, and first says that no one should confuse the methods of Lorenz and Paci, inasmuch as they are different, *vide* the fact that Lorenz reduction is accomplished by "ultraphysiological abduction," the head thus entering the acetabulum over its posterior rim, whereas the Paci movement brings the head in over the inferior part of the rim. He claims that the statements of Ridlon regarding percentage of anatomic restorations were made prematurely, and further states that he was able to recognize three cases that were reported in the Ridlon statistics as anterior transposition as being cases in which he conducted the after treatment and obtained anatomic repositions.

Hovath¹⁴ has reported fifty-seven cases. Fourteen of these were anatomic replacements, twenty-one were anterior transpositions with good functional results, fifteen are still under treatment, ten were failures to reduce, nine relapsed and eleven were lost track of.

This last year has been full of highly instructive reports and progressive work on this important branch of orthopedics, and the results shown are very encouraging. It does not seem visionary, considering what has been done, to look forward with assurance to a day when the cases that are irreducible have closely approached the vanishing point.

TUBERCULOUS HIP DISEASE.

The most noteworthy piece of work on this subject has come from France. Cabot¹⁵ (in a 230-page book) has taken up the subject thoroughly, going into all the refinements of diagnosis and treatment. Although there is nothing startlingly new or

original in the book, there is much of interest; as, for instance, the chapter on the aspiration of hip abscesses and the chapter on osteotomy. The application of the plaster of Paris spica—the method of treatment preferred by the author—is described in the most painstaking way, and is full of valuable hints which might be applied to plaster of Paris treatment in general.

Freiburg¹⁶ has recommended an appliance for bed traction, the virtues of which are that the limb is held steady, and that the weight acts in extension practically as well as in theory. The only possible objection to the apparatus would be its cost. Freiburg¹⁷ has also called attention to Bier's "congestive method" in the treatment of joint tuberculosis, and has reported three cases where he employed the method with very satisfactory results. He recommends the method as an adjuvant to the resources long at our disposal. The technique of the treatment is to apply to the diseased joint a bandage which produces constriction and hyperemia. The congestion thus obtained should never be allowed to pass beyond the hot stage, and the patient should feel no pain whatever. The treatment should not be applied for more than an hour daily.

POTT'S DISEASE.

Taylor¹⁸ and Thronndike,¹⁹ writing independently, have called attention to the fact that statistical data on the question of the increase or improvement in deformity in Pott's disease is meagre. In the opinion of both of these observers more attention should be paid in dispensary practice to the recording of increase or diminution in the kyphos, and the jacket should be applied to the individual with due consideration of his own response to correction. The stimulation of interest along these lines will do much to improve the mediocre results that are now being obtained. Young²⁰ has described a very efficient apparatus for the treatment of upper dorsal and cervical Pott's disease. This consists of a cuirass made of felt or celluloid, which is constructed on a cast of the child's back; the mould for the cast is taken with the patient lying face down on a canvas hammock; the head, neck and trunk are included. The patient is secured in this by broad webbing bands. Wullstein,²¹ in an elaborate article on the treatment of Pott's, recommends an appliance very similar to this. He corrects the deformity on a machine, however,

and applies a plaster. Using this plaster as a mould, he makes his celluloid appliance, but joints it so that a greater or less degree of correction may be secured by screws at the will of the surgeon.

SCOLIOSIS AND ROUND SHOULDER.

Hoke²² has operated for the deformity, and his work (which involved many careful experiments, the designing of many special instruments, and a series of operations on the cadaver and on animals) ended in a practical improvement which could not have been obtained in any other way. His operation, in brief, was to divide the ribs on both sides and remould the deformed thorax to as nearly the normal conformity as possible. The difficulties encountered, the patience displayed on the part of the patient, and the ingenuity of the operator all go to make this a remarkable piece of work. The operation would only be suitable in cases where the osseous deformity was evidently of such a nature that exercises and jackets could accomplish nothing. Lovett²³ has written again on the element of torsion in scoliosis. His method for applying corrective jackets is in theory the best, and practically, also, as shown by his results.

Lovett²⁴ in an article on the forcible correction of round shoulders, describes an apparatus which exerts an accurately applied lever force in such a manner that there is no escape therefrom, the only question being how much correction is safe. He states that some mechanical stretching is necessary in round shoulders, the hope being to restore the dorsal spine to a more normal range of hyperextension and then to educate the muscles to hold the improved position.

PARALYSIS.

Poliomyelitis has been approached by Spitzzy²⁵ on the side of nerve grafting, and an interesting field of speculation opened. He has given us the technic of his laboratory operations in neuroplasty, and suggests that as nerve grafting is a method of operative treatment which does not interfere with other methods of treatment practiced, it should be given a trial. That it may result in return of power, Cushing²⁶ has demonstrated in an anastomosis of the facial nerve for facial paralysis. Young²⁷ reports a case of paralysis of the anterior tibial muscle which was

benefited by an anastomosis of the musculo-cutaneous with the branches of the peroneal nerve which supply the anterior tibial muscle. He calls attention to the necessity in an operation like this for anatomic exactness and precision in recognizing the nerves.

Dane and Townsend²⁸ have published a series of fifty cases of paralysis of the lower leg (poliomyelitis) operated upon by several men, a sufficient number of years having elapsed since operation to justly judge the results. Tendon transplantation, arthrodesis and astragalectomy were the operations done. The results would seem to show that tendon transplantation is not so satisfactory, except in carefully selected cases, as astragalectomy or arthrodesis.

Hoffa²⁹ writes that to get good results it is important to obtain the highest possible tension on the grafted tendon in an over-correction of the deformity, and to do this it is always better to correct the deformity before the operation. He recommends the following new operations: In spastic contracture of the forearm, in order to overcome pronation, change the pronator radii teres into a supinator by transferring its origin from the internal condyle to the external condyle of the humerus. Transplant the trapezius to the position of a paralyzed deltoid in paralysis of the shoulder joint.

Gibney³⁰ reports the removal of the tensor vagina femoris in a case of spastic paralysis in order to correct internal rotation which could not be overcome by other procedures. The operation was at the time of report a success, but lapse of time will be necessary to judge its permanent effect. Clarke³¹ reports a case where he cut out on each side about an inch of the adductor longus and gracilis, with parts of the adductor brevis and magnus; also parts of the hamstrings and tendo Achillis for the relief of contractures in spastic paralysis. He thus secured a considerable relaxation of the stronger muscle groups and the case was much improved. Tubby³² has given a report of successful muscle grafting for paralysis. In the case reported the serratus magnus was paralyzed. He took a large part of the sternal portion of the pectoralis major, dividing the humeral attachment of this, the end was sutured with silk into the paralyzed serratus, with

the result that power returned to the serratus. He has reported only one case, but the suggestion is a valuable one.

FOOT ERROR.

A statement from such a man as Gibney⁸⁸ carries with it an irrefutable amount of weight, even if it be of a revolutionary character regarding the character of congenital talipes equino varus. Gibney has written that, in his opinion, the treatment in these cases has been begun too early; that until the foot becomes a weight-bearing, walking apparatus attempts at correction and cure are of little avail, the results obtained not justifying themselves when placed in comparison with the pain and disturbance consequent on the treatment in young children.

Blodgett⁸⁴ has done one of the best pieces of work that has been attempted during the year. Up to the time of the appearance of this paper there were no reliable statistics on the subject of static foot error. He has gone over the treatment and the results of one thousand cases of flat foot, and put his conclusions into such form as to be easily available. His work covers three years and is decidedly praiseworthy. Some of the interesting points brought to light are: (1) That 40.8 per cent. of orthopedic cases have static flat foot; (2) that two-thirds of the cases were under forty years of age; (3) occupation is shown to play an important part in the etiology; (4) cases are most frequent in the summer; (5) pain is most commonly localized at or near the astragalo-scaphoid articulation. As to the results of treatment, plate treatment was the most efficient: 32.7 per cent. were entirely relieved, 44.9 per cent. were relieved, 7.8 per cent. were slightly relieved, 13.6 per cent. were not relieved, .1 per cent. was made worse. The fact that it is necessary to change frequently the form of support—no matter whether it be plate or plate substitute—is clearly demonstrated.

Bradford⁸⁵ has written on the relation of boots to humped foot or metatarso-tarsal valgus, and has shown that constricting shoes are responsible for this condition. The human weakness that prompts the buyer to purchase small and injurious shoes is responsible for this deformity and the remedy is readily prescribed, but not easily applied.

COXA VERA AND FRACTURE OF THE FEMORAL NECK.

Whitman⁸⁶ has called attention to the distinction between fracture of the neck of the femur and epiphyseal disjunction in early life. He divides the cases into three classes: (1) Simple, direct fracture of the neck, usually incomplete, occasionally complete. This class should be treated by putting the limb up in a plaster of Paris spica at the limit of normal abduction. (2) Direct epiphyseal disjunction, usually incomplete, in rare instances complete. These cases should be operated upon and the head replaced. Removal of the epiphysis should only be done in case of necessity. (3) An indefinite class, in which the deformity is at or in close proximity to the epiphyseal junction. Those patients are of a class that have so-called static deformities of adolescence, and injury here is probably an aggravating rather than a direct cause of distortion. Under this head coxa vera is included. Excision of a wedge at the base of the trochanter is the operation here to be employed.

Hoffa⁸⁷ states that epiphyseal separation is often mistaken for hip disease. He is inclined to place all cases of coxa vera under the head of epiphyseal disjunctions.

Moore⁸⁸ has written of his method for obtaining a bony union in fractures of the femoral neck in aged persons. He reports several very successful cases, and states that the reason why this class of patients is regarded as being beyond surgical aid is due to the fact that the proper kind of treatment has never been applied except in exceptional instances. There is nothing in the old person that is against bony union if the fragments are placed in apposition. In order to obtain apposition of fragment ends he anesthetizes the patient, flexes the thigh to lift the tendon of the psoas away from the seat of fracture and makes traction while bringing the leg down into a normal position. Fifteen to twenty pounds traction is then applied by weight and pulley. Ten to fifteen pounds pull is also applied to the upper and inner side of the thigh by weight and pulley. This side pull is the special feature that produces the good results, its action being to lift the upper end of the long fragment upward and outward, and by making the capsular ligament taut bring the short fragment into position. The fact that union has followed this treatment in a number of cases is of no small significance.

Painter³⁹ reports three cases of intracapsular fracture of the femoral neck. In one case the fragments were wired together with silver wire; in a second the bone ends were trimmed off and the leg put up in 25° abduction. The fragments were apposed in the third and a ten-penny wire nail driven through to secure them. Good functional results followed all these operations.

Harting⁴⁰ defines coxa vera as a static deformity due to burdening the upper end of a femur weakened by rickets, trauma, tuberculosis or osteomalacia.

Froelich⁴¹ divides the cases into symptomatic and an essential coxa vera. In the symptomatic class there is hypertrophy of the neck, and the angle is very near the trochanter major. In the essential class the neck is not hypertrophied, and the angle is near the head. Reiner⁴² is of the opinion that coxa vera is an antecedent step in the deforming process which has for its final result the congenitally defective femur. Codivilla⁴³ recommends osteotomy at the neck, the seat of the deformity. He does not believe in the loss of any bone, or that the operation should involve the coxo-femoral joint.

The visit of Professor Hoffa, of Berlin, to this country in the early summer of 1904 was an event of great interest and satisfaction. The character of the man is such that entertainments given in his honor were a long to be remembered pleasure to those who were fortunate enough to be present. He attended the meeting of the American Orthopedic Association at Atlantic City, and contributed much to the interest of that meeting. He operated and lectured in most of our large cities, and gave a lecture in the German educational exhibit at the Louisiana Purchase Exposition. He was accompanied by Dr. Hanz Spitzzy, of Graz, Austria. In passing, a word of comment is not out of place on the fact that this visit was not marred by an unpleasant newspaper notoriety.

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ILEO-COLITIS IN CHILDREN.

BY W. S. WALLACE, M. D.,
OF EXCELSIOR SPRINGS, MISSOURI.

My subject is a seasonable one at this time, as during this and next month we will meet with it more frequently than with any other disease of childhood, and if we are not always on guard it will claim more victims than will any other disease during July and August.

The season of the year points us to the etiology of this disease, probably the most important factor of which is extreme heat. In statistics taken from cases in the hospitals of New York City it was found that the number of cases of ileo-colitis, together with the mortality, rose or fell in more or less direct ratio with the temperature and atmospheric conditions, and even with us, situated as we are, the debilitating effects of the heated term, together with its effect on the decomposition of food, play an important part in the causation of this disease. Improper food, unripe or over-ripe fruit, copious draughts of ice water, everything which may act to hinder digestion or impair nutrition, acts in a causative relation.

The pathology of this disease has been the subject of many learned discussions, but I am persuaded that post-mortems fail to give us an adequate idea of the intense congestion present before death. There is evidently at the beginning a swollen and congested mucous surface, which congestion increases until circulation being interfered with, necrosis and ulceration of circumscribed areas take place, which may be superficial or deep, and which usually implicate the glandular structures in the walls of the bowel, the bowel is filled with an acrid, greenish fluid, in which floats fecal matter, shreds of mucous membrane, and, may be, blood and quantities of undigested food.

The ushering in of ileo-colitis is attended by restlessness and pain, followed by vomiting and nausea, the temperature rises to 102° or 104° F., bowels become tender and tympanitic, followed soon by alvine discharges more or less profuse, at first thin and watery, later becoming scanty, very frequent and composed largely of mucus, very small amounts of fecal matter and probably blood.

The discharges are greenish color, usually all the way through the course of the disease. The quantity of blood and the height of the temperature are usually in proportion to the depth and severity of the ulcerative process. As the disease progresses the little patient shows all too plainly how severe the tax is upon its vital forces by the rapid loss of flesh and great weakness. Under careful treatment the character and frequency of the stools gradually change, the fever falls and the appetite returns, and recovery is soon complete. Otherwise the temperature remains from 101° to 102° , vomiting and frequent bloody stools continue, emaciation is progressive, the dreaded brain symptoms appear, and before long death ends the scene.

It is my custom, when called to attend such a case, at once to withdraw all food for twelve to twenty-four hours, or until I have thoroughly cleared out the alimentary tract, and then to select the smallest variety and quantity of food consistent with condition, and, if necessary, to predigest it.

Albumin water (the white of egg with water, a bit of sugar and a few drops of lemon juice).

Sterilized milk diluted with water, lime water, or carbonated Vichy.

Bovine I consider one of the best foods, diluted with water, milk or grape juice, and especially as a rectal nutritive enema where the stomach is extremely irritable or digestion and assimilation poor, and later, during convalescence, sterilized milk or malted milk.

I want to emphasize the fact that the matter of feeding is even more important than medication, and unless it is given the strictest attention you will often meet with failures where you might succeed. Even the drinking water should be boiled, and every precaution taken to prevent further infection of the already inflamed bowel. I have spoken of thoroughly emptying the *prima via*, and it is of the first importance. It is my custom to give a grain of calomel in divided doses with *sodi bicarbonate*, to be followed shortly by frequent small doses of Abbott's saline laxative, two tablespoonfuls in a glass of water and flavored with sugar and lemon, a tablespoonful of the solution to be given every half hour till effect. This once accomplished, we can turn our attention to intestinal antiseptics, and of these we have a great

number, but a few have proven so effective for me that I am partial to them—the salts of bismuth are among the first, the subnitrate or salicylate, but especially bismuth with resorcin and some of the acids of the phenol group, meet with my approval.

The sulphocarbulates of zinc, lime and soda I find effective where the stomach will retain it. Where the temperature is high, the antipyretic and antiseptic effect of salol is sometimes desirable, but the important part is to select the agent you wish to do the work, and then push it to its full effect, give it frequently until the odorless stool and lowered temperature proclaim its effect, use as little of the old symptomatic plan of treatment as possible, study your little patient carefully, make up a clinical picture of its condition, decide definitely what you want to do, then do it.

I have not referred to fever and pain, checking the discharges, etc., because I try to so conduct my cases that these symptoms will not be a factor in the case, but if they come in in spite of me, I control fever by cool sponging, and if pain or excessive peristalsis is present, it calls for a very minute dose of opium for the time-being, but, properly handled, there is small need for this.

REPORT OF A CASE.

Baby B., sixteen months old (a girl), ordinarily well nourished, surroundings very poor and unhygienic, ten hours after eating three half-ripe apples, attacked by severe chill with vomiting and pain. I did not see her until four days after the attack; temperature was then $103\frac{1}{2}^{\circ}$; pulse 120; respiration 30; bowel tender and distended with gas; free alvine discharges of thin, greenish, blood-streaked material, with much mucus; odor very offensive. There was great thirst, but water would at once produce vomiting. I gave at once calolactose, two grains dry on the tongue, repeated at one-half hour intervals till six doses were given; resorbisnol, six grain powder every two hours; ordered cool sponging until fever was reduced, and withdrew all food of whatever character. Called the next morning, twelve hours later, to find fever 100° ; pulse 110; discharges less free, but quite frequent, and showing some evidence of biliary secretion, but blood-streaked; vomiting had stopped. I ordered the saline solution referred to above, on chocolate-coated tablet every two hours, and there being some tenesmus, I gave five drops tincture opii camph., to be repeated

in one hour till effect. At four p.m. her temperature was still 100, bowels very tender, but less tympanitic. Ordered the white of an egg in water every four hours, a small amount; stopped the saline solution and continued intestinal antiseptic, one tablet every three hours. This plan of treatment was kept up, and on the fourth day of treatment there was added high colonic flushings and Bovinine given diluted, alternately with white of egg, with the flushings continued. The fifth day of treatment showed a normal temperature, and under careful feeding and regulation of bowels when needed with the old neutralizing cordial, this little patient went on to complete recovery by the end of the second week.

This, though brief, will, I hope, serve to give an idea of my plan of treatment of ileo-colitis, which has furnished me most most happy results.

SOCIETY PROCEEDINGS

PHILADELPHIA PEDIATRIC SOCIETY.

December 13, 1904.

The President, DR. JOHN H. JOPSON, in the Chair.

INCONTINENCE OF FECES IN CHILDREN.—This subject was discussed in a paper by Dr. M. Ostheimer. He said that whereas enuresis was common in children, incontinence of both feces and urine is unusual, and incontinence of feces alone is very rare. In certain cases some cause, either general or local, can be found for the condition; in another class the general nervous condition of the patient is responsible. Sometimes the incontinence is observed from infancy, and in other cases it appears suddenly after the third year in children apparently healthy. The author described twelve cases from literature which illustrated the classification he had made, and added four which had come under his own observation. Treatment by fresh air, nourishing food, strychnin and various tonics was successful, although the condition might recur in case the patient became run down for any cause.

HEMORRHAGE OF SYPHILITIC ORIGIN IN THE NEW-BORN.—This subject was treated by Dr. W. R. Wilson, who called attention to the fact that hemorrhages in the new-born, although frequently due to other causes, often accompanied the more generally recognized evidences of syphilis. The form of syphilis in which this symptom appears does not necessarily exhibit any cachexia, and is referable, consequently, to a constitutional tendency. It is likely that the syphilis is not directly responsible for the hemorrhages, but that they are due to degenerative changes in the blood and vessels, resulting from the syphilitic condition.

About one and one-third per cent. of the children born at the Lying-in Charity Hospital in Philadelphia between 1901 and 1904 suffered from hemorrhage, and the greater number of such infants died. In about 22 per cent. of them a history of syphilis was found in the parents, or else syphilis was proved in the infant.

Dr. Wilson explained the various forms under which the hemorrhage might appear, and discussed the question of its immediate cause. He thought that the pathological condition of the vessels in syphilis was not sufficient to account for the hemorrhagic tendency, since the extravasation is most commonly observed in the form of capillary oozing. More probably it is due to a disturbance of the relation between the character of the blood

and the containing capillaries. The fact that bleeding from the cord persists in spite of ligation shows that the coagulability is reduced, and the efficacy in such cases of drugs, calcium chlorid, for instance, calculated to increase coagulability is another bit of evidence in the same direction.

Syphilis in which these hemorrhages occur usually fails to show the characteristic symptoms, and when any such are present they are more often the congenital manifestations than the hereditary ones. In the hemorrhagic cases the infection would seem to have been generally remote. Icterus is present in some degree in nearly every case of hemorrhage.

Dr. Wilson reported seven cases, all fatal, and three of still-birth, which illustrated his conclusions.

Prompt treatment is demanded by evidence of internal hemorrhage in syphilitic children. Rest is of primary importance, and the infant should be kept in the incubator and disturbed as little as possible. Inunctions of mercury may be used, but in case of extensive skin hemorrhages without rubbing. Oil baths may alternate with these. In fever or intracranial hemorrhage the ice cap is useful. In case of severe melena, nourishment should be given in small quantities, frequently repeated, with a view not to encourage peristalsis. For internal use the following drugs are employed: suprarenal extract, half grain doses repeated; Adrenalin solution, 1-1000 one drop repeated; Gelatin water, two drams to one pint; Fluid extract of ergot, dose one drop.

Dr. Jopson spoke with strong approval of Dr. Wilson's clear statement of the classification of the various forms of hemorrhage of the newborn.

DURATION OF THE PRODROMAL PERIOD IN RÖTHELN.—This question was discussed by Dr. D. J. M. Miller, who opened his paper with a summary of the literature upon this point. The accumulated testimony seems to be that the prodromal period in röteln is commonly very brief, not over 24 hours, or lacking entirely, and that only in rare instances does it extend over a period of 2, 3, 4, or even 6 or 7 days. Dr. Miller, however, believes that this longer type occurs much more frequently than indicated, owing to the fact that physicians are not called in until the eruption appears, and the preliminary symptoms escape the notice of mothers and nurses. In the only instances, three in number, where he had been in a position to determine accurately the duration of the prodromal period it had been prolonged until the fourth, and in one case to the sixth, day. This last case exhibited a distinct remission during the second, third and fourth days. The occurrence of this remission, mentioned also by Emminghaus, may partially account for the prevalent ideas as to a brief prodromal

mal period, the exacerbation being easily mistaken for the onset.

Dr. Westcott had also noticed a distinct febrile prodromal period in rōtheln, and regarded as of considerable importance in distinguishing the disease from mild scarlet fever. He himself had seldom seen the so-called scarletiform type, but scarlet fever of a mild type was so often encountered that whenever a rash was at all suspicious in character that diagnosis should be made provisionally.

Dr. Miller said that he had also never seen the scarletiform eruption in rōtheln. It more often resembled measles.

CHICAGO PEDIATRIC SOCIETY.

January 17, 1905.

The President, DR. SAMUEL J. WALKER, in the Chair.

HYPERTROPHY OF THE FAUCIAL AND PHARYNGEAL TONSILS IN CHILDREN: IMPORTANCE AND NECESSITY FOR EARLY DIAGNOSIS AND TREATMENT.—Dr. T. Melville Hardie read this paper by invitation.

The author stated that one of the troublesome features of the case is the fact that so much has been said about adenoids in the past thirty-five years that it is really difficult for the average practitioner of laryngology and otology to believe that mankind could possibly have existed comfortably with such a deforming, ear-destroying, disease-bringing body of lymphoid tissue in his centuries old naso-pharynx. In the matter of the faucial tonsils we have been better treated, for Celsus (A. D., 10) speaks of tonsil incision with the familiar manner of one who considers it an ordinary operation, and Paul of Egina, A.D., 750, directs that the head of the patient be held, his tongue pressed down with a spatula by assistants, while the tonsil, being seized and drawn outward by a tenaculum, is cut out by the root. During the succeeding centuries it is true the operation was not always popular. Dionis, 1672, absolutely opposed removal of the tonsils because of the physiological importance of the glands; and Heister, 1683, observed that "this operation is not only too severe and cruel, but also too difficult in its performance to come into the practice of moderns, because of the obscure situation of the tonsils." From Morell Mackenzie's historical sketch, however, we learn that we have been more vigorously operated upon for the past one hundred and fifty years, nor is it at all likely that the faucial, any more than that other lamented segment of Waldeyer's ring, will suffer future neglect until that day arrives when mind can so prevail over matter that we can not be harmed by such constant handicaps as mouth-breathing, for example, or by the occasional, but all too frequent, attacks of the Klebs-Loeffler bacillus.

1. What, then, are the functions of the tonsils that they should be preserved?

2. What harm are they responsible for and how is it produced?

3. What benefits and what harm may follow their removal?

- (a) It is to be remembered that the tonsils are distinct, localized collections of lymphoid tissue, into which the epithelium is invaginated and which contains numbers of round or ovoid bodies called the follicles of the tonsils. These follicles are constantly manufacturing leucocytes which pass into the efferent lymph

vessels or out into the crypts formed by the invaginations of the epithelium. This has been proven and it is assumed by some and denied by others that these leucocytes by virtue of their phagocytic action protect the organism from infection. Hodenpyl, after elaborate experiments, concluded that the normal tonsil absorbs neither fluid nor solid matter, and that it cannot be penetrated by bacteria. It has been proved, however, by Goodale, by means of carmine injected into the tonsillar crypts, that absorption of fluids and finely divided solid particles does take place. This was also independently shown by Hendelsohn, who used dyes, which were blown on the surface of the tonsil. All other suggested functions, such as the furnishing of a lubricant for the food bolus, are not merely theoretical, but improbably because the normal tonsil is so small that its function must be of no more importance than that of a small lymph gland.

(b) For what harm are the tonsils responsible, and how is it produced? If we believe with Mayo Collier that respiration is the supreme function of the economy, we must perforce conclude that any considerable interference with this function is decidedly injurious. Physiologists have proven that the circulation and oxygenation of the blood, not only in the systemic, but in the portal system as well, is dependent on respiration. Enlarged tonsils and adenoids act mechanically as an obstruction to free respiration, and mouth-breathing, which results, produces effects on the mucous membrane of the respiratory tract that are prodigious. The inspired air passes normally upward to the level of the middle turbinated body, thence backward to the vault of the pharynx, whence it is deflected downward, and the function of the nose is to warm, saturate with moisture and cleanse the inspired air, and the irritation which results from the breathing of unmoistened and unfiltered air gives rise, directly or indirectly, to one or all of the following: Pharyngitis, laryngitis, and consequent laryngeal spasm, tracheitis, bronchitis and pneumonia. Mouth-breathing increases the vacuous pressure on the walls of the respiratory tract, and hence is responsible in some degree for the partial collapse of the chest wall, "chicken-breast", so frequently seen in rachitic children who suffer from enlargement of the pharyngeal tonsil. It is, furthermore, believed by man that narrowing of the alveolar arch of the upper jaw is a consequence of mouth-breathing. As to the manner in which is accomplished there has been much discussion.

In considering the various causes which produce the abnormality of the palate, Swain would lay most stress upon the lack of proper secretion of the maxillary sinuses, as retarding their development, and hence that of the whole superior maxilla. The author quoted the opinion of various writers as to the causes of this abnormality of the palate.

And now, what can be said about the ears? Adenoid vegetations and the faucial tonsils are a constant menace to the hearing, and it has come to be a feeling on the part of most of us whose work largely concerns the ear and throat, that the practitioner who uses carbolic acid and glycerine and the hot water bag without insisting upon the after removal of the tonsils and adenoids, which are the usual cause of the ear-ache, is guilty of malpractice. The growth may mechanically obstruct the Eustachian opening, although fortunately for children it is placed lower down on the lateral wall of the pharynx than is the case in the adult. The venous congestion present in the vault of the pharynx causes a secondary congestion in both the middle ear and labyrinth. The closure of the Eustachian tube interferes with the ventilation of the middle ear, and as a consequence the external atmospheric pressure forces the drumhead inward.

A great deal has been written in recent years upon the infections which may enter the organism through the tonsils. The faucial tonsils have, by reason of their situation, received the most study, and, having granted the contentions of Goodale and Lexer, we must conclude that these glands when hypertrophied not only play an important part in the matter of infection, but seriously complicate the course of many of these infections. Goodale examined a number of tonsils affected for various periods by an acute infection, and concluded that the micro-organisms multiplying in the crypts may produce toxins which, being absorbed, give rise to an acute proliferative tonsillitis, or by passing through the epithelium cause abscesses in the follicles themselves, or may be carried by the efferent lymph vessels to the neighboring lymph glands, producing an adenitis. Lexer's experiments prove that while certain streptococci were not absorbed by the tonsil, others were very virulent, causing death either in two days or by a slower general infection, as manifested by the suppuration of fractures and development of lymphatic abscesses.

Mayer and Ullman have contributed two comprehensive papers on the tonsils as portals of infection and Ullman concludes:

"1. That the normal tonsil has a physiological function, probably protective.

"2. That being in itself often diseased, the physiological function of the tonsil is impaired, and that instead of being protective, it is the nidus for the growth and distribution of pathogenic organisms and their poisonous products into the system.

"3. That many grave and fatal general infections have their origin in the tonsils.

"4. That if the exanthemata, especially scarlatina, are of bacterial origin, the tonsil acts in part as a port of entry.

"5. That acute articular rheumatism and the diseases often associated with it, endocarditis and chorea, in a great majority of

cases are due to the action of attenuated bacteria, their toxins or both toxins and bacteria entering the general system through a diseased tonsil."

Tuberculosis is, perhaps, the most frequent chronic infection which enter the system by way of the tonsillar tissue in the throat and naso-pharynx. The author cited several authorities to establish this point.

After mentioning a few of the other complications of tonsillar hypertrophy, the author concluded his interesting paper in the following words: "I had intended to discuss the benefits which follow the removal of tonsils, but will content myself with the assertion that there is improvement in almost every particular and in almost every patient. Deaf-mutism is not cured by the removal of adenoid vegetations, but almost everything else attributable to the affection is. But the greatest reason for operation is the prophylactic.

"What harm may follow the removal of the tonsils? The consideration of this question is, perhaps, apart from the general purpose of this paper. The only possibility of evil comes from the anæsthetic and from hemorrhage, and I have taken the liberty of mentioning the matter to protest against the use of chloroform in operations for the removal of tonsils and adenoids. We may have our doubts as to some of the other anæsthetics, but it has been shown by Halsted, Hinkel, and others that the lymphatic diathesis especially favors the depressing effect of chloroform upon the heart, and its use should not be considered when there exist other anæsthetics relatively safe. Several cases of fatal bleeding after the removal of adenoids and tonsils have been reported, and some others have occurred which have not been published. In my opinion, no one should remove these growths unless certain that his patient is not a subject of hemophilia. For the others we must be prepared."

Dr. George E. Shambaugh read a paper entitled—

EARLY COMPLICATIONS IN ACUTE INFECTIONS COMMON TO INFANTS AND YOUNG CHILDREN; FREQUENCY, EARLY DIAGNOSIS AND TREATMENT.—The great frequency of ear disease in early childhood is due in part to the anatomical condition which allows infection from the naso pharynx to reach the cavum tympani more readily at this age than in the adult, but more to the fact that in childhood occur with great frequency certain acute infectious fevers which, occurring at any age of life, are very prone to produce middle ear disease.

The middle ear disease results often from infection extending along the tuba auditiva to the cavum tympani, but there are reasons for doubting whether this is the only method of extension or even the more common one.

The otitis media complicating the infectious fevers in early

childhood is occasionally the result of invasion of the cavum tympani by the specific germ causing the general infection, but it frequently happens that the otitis media is caused by other pus producing micro-organisms, particularly the streptococcus, staphylococcus and the pneumococcus.

Purulent otitis media following the acute infections of childhood is a condition much more to be feared often than the original general infection. Every physician should be thoroughly awake to the seriousness of this disease and alert to detect its existence in its earliest stages, for much of the dangerous character of the condition can often be averted by proper treatment applied when the disease first manifests itself. In scarlet fever, as well as in measles, there often occurs the most rapid and extensive destruction of soft parts and bones of the ear showing little tendency to heal, producing marked permanent disturbance of hearing and having a high rate of mortality.

The diagnosis is made by inspection of the membrana tympani. This is often rendered difficult from the narrowness of the canal, and the presence of a plug of desquamated epithelium which frequently forms in the bottom of the canal.

In scarlet fever it frequently happens that acute necrosis of the temporal bone occurs with no complaint except headache, with no pronounced signs over the mastoid, and even in the absence of disease in the cavum tympani.

The symptoms which should lead one to suspect an otitis media in young children are extreme restlessness, sudden high temperature, the occurrence of symptoms of meningitis.

Otitis media in childhood often takes a very protracted course running through many weeks without causing rupture of the drum, yet producing at irregular intervals rise and fall of temperature until finally the rupture occurs.

EDITORIAL

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

That the question of cerebro-spinal meningitis is rapidly assuming formidable proportions is a truth not to be masked. The epidemic of 1904 claimed 1,010 victims in New York City, and every practitioner should feel it his duty to equip himself to the best of his ability in order to be as ready as possible to meet this dread disease.

The importance of this matter has been recognized by the foremost specialists of the profession, and a symposium of the recognized authorities at the annual meeting of the Medical Society of the State of New York in Albany, January 31, 1905, offers the best practical and theoretical knowledge available on the subject. This symposium is discussed in the *Albany Medical Annals* for March, and should be consulted by every physician who appreciates the menace of this disorder.

The pathology and bacteriology are discussed by Dr. William T. Councilman of Boston, who points out that the three organisms usually concerned in the infection are the *Diplococcus intracellularis meningitidis*, the *Pneumococcus* and the *Streptococcus*. The first of these is responsible for the epidemic type of the disease, and sporadic cases are more frequent than is generally recognized. The prognosis is much more hopeful in this infection than in that of the pneumococcus or streptococcus. The organism may be found in the nose, associated with acute rhinitis, and it is probable that infection of the meninges takes place by extension from some of the adjacent mucous membranes by means of the lymphatics. Dr. Councilman believes that the frequency of pneumococcus meningitis is over-estimated. Streptococcus meningitis has a greater tendency to extend along the cerebral nerves than have the other forms; and both it and that due to the pneumococcus show, accompanying the inflammation, an acute proliferative inflammation of the veins and arteries, a lesion that has not been found in meningitis due to the *Diplococcus meningitidis*.

The symptoms and diagnosis falls to the share of Dr. Henry

L. Elsner of Syracuse, who treats it clearly and carefully, giving particular attention to the questions of the Kernig phenomenon and of lumbar puncture, and although the limits of his paper prevent an adequate discussion of the differential diagnosis of conditions resembling cerebro-spinal meningitis, what he says on that topic cannot fail to be helpfully suggestive.

The treatment of the disease is taken up by Dr. Charles G. Stockton of Buffalo, who reaches the conclusion that among the various measures advised the following give best promise of benefit: first, absolute quiet in well-ventilated, darkened rooms; second, great attention to the proper performance of all the functions of the body; third, hot baths after the method of Aufrecht; fourth, intraspinal puncture with drainage where necessary to relieve severe pressure symptoms; fifth, antipyrin for reduction of temperature and the relief of headache and hyperesthesia; sixth, opium or the bromides, alone or in connection with antipyrin, for relief of convulsions and pressure symptoms generally; seventh, mercury when needed for laxative effect or to stimulate the organs of elimination.

Dr. Stockton emphasizes the fact that "the sanitarian is more useful than the therapist" in combating this disease, and warns against the dangers of overcrowding and poor ventilation.

The eye symptoms in cerebro-spinal meningitis was the subject assigned to Dr. A. E. Davis of New York, and although the great variation in these symptoms in different epidemics makes the estimating of them difficult, Dr. Davis thinks they may be of much importance in clearing up a diagnosis. Inequality of the pupils, especially if accompanied by squint, should place the practitioner on his guard, and many of the motor symptoms can be observed without the use of the ophthalmoscope and should always be looked for, such as paralysis of the different muscles, pupillary changes, ptosis, etc. The mortality is noticeably higher in cases where eye lesions are present, especially if the fundus be affected.

Following the reading of the papers, a vigorous discussion adds much to the value of this symposium, which no physician can afford to miss.

EXPERIMENTAL MEASLES.

The literature on the subject of experimental measles dates back to the experiments of Francis Home of Edinburgh, in 1758. Home proceeded on the assumption that the cough and lung trouble, frequently such a distressing feature of the disease, was due to receiving the infection mostly through the lungs, and hoped, by communicating the infection by the skin alone, to render the disease less troublesome and dangerous. Various difficulties stood in his way. The limited technic of the day did not offer any adequate method of obtaining the virus unmixed with common microbes. All inoculations must be performed on human beings, as the disease is, so far as known, not communicable to animals. Nevertheless he went to work, and left us an elaborate report of statistics regarding the fifteen cases inoculated by him. His naive satisfaction in the very inconclusive results cannot be shared by us to-day, but seems to have been accepted by his contemporaries and those of following generations, with the exception of the Dutch physicians, Thuessink and Themmen. Themmen secured uniformly negative results from experiments similar to those of Home, and, not content with discrediting the Scotchman's conclusions, vehemently asserted that the alleged inoculations had never been made. We have little reason, however, to believe this latter accusation, and may accept Home's report of the facts, however much we may dissent from his interpretation of them. His method was to take blood from a cutaneous vein amongst the measles at what he considered the period of "highest acrimony," and after saturating with this blood a bit of cotton, the cotton was placed in an incision in the arm of the person to be inoculated and allowed to remain there three days. Home believed that in every case he produced measles of a more mild and manageable sort than those by natural infection, but there is little doubt that all his fifteen cases had contracted the disease previous to his inoculation.

Dr. J. Cook in 1767 advocated the inoculation for measles, but mentioned "the watery humor that stands in the eyes" of patients ill with measles as the proper vehicle of infection. Various other writers recommended skin, tears, nasal discharge and saliva.

From time to time other experiments were conducted, with various degrees of "success," but all, to modern minds, were valueless, owing to the failure to eliminate other possible factors than those intentionally introduced, and almost invariably where measles followed the inoculation the length of time intervening before their appearance and the existence of other cases in the vicinity suggested irresistibly the probability that the disease was contracted naturally, either previous to or subsequent to the inoculation.

During the epidemic of measles in Vienna in 1845-57, F. Mayr made some observations on the subject which were more acute than those of his predecessors. He inoculated with material obtained by scratching the center of a rubeolous spot, and measles appeared duly. Fresh nasal mucus placed upon the membrane of the nose succeeded in two out of three cases. But Mayr points out the fact that no diminution in the gravity of the disease was secured, and dismisses the process as of no practical importance.

Of late, however, some interesting experiments have been undertaken by Ludvig Hektoen of the Memorial Institute for Infectious Diseases in Chicago, for the purpose of determining "whether or not in measles at the height of the attack the blood contains the cause of the disease." These experiments are reported in the *Journal of Infectious Diseases* for March, 1905.

Blood was taken from a boy of nine on the fourth day of a mild, but typical, attack of measles, at the time when the typical rash appeared. The skin of the right elbow was scrubbed with soap and water and then alcohol, after which 4 c.c. of blood were withdrawn. With this, blood cultures were made upon ascites broth, as described in detail in the article cited, and finally a healthy young man submitted himself to inoculation. In this case precautions had prevented the possibility of natural infection. Thirteen days after the injection the patient's temperature began to rise somewhat, and two days later the eruption appeared. No respiratory symptoms appeared at any time and he made an uneventful recovery, his appetite remaining unimpaired throughout the course of the disease.

In the second case the blood was taken from an Irish girl

21 years old, and the injection made in the back of a young man of 28 years. This time the rise in temperature was detected on the evening of the eleventh day, followed by slight conjunctivitis, some cough, mucus in throat, and redness of tonsils. The typical eruption appeared at the usual time. The patient was not seriously ill, and recovery was prompt.

Dr. Hecktoen's conclusions may be quoted:

"The virus of measles is present in the blood of the patients some time at least during the first thirty hours of the eruption; furthermore, the virus retains its virulence for at least twenty-four hours when such blood is inoculated into ascites broth and kept at 37° C. It is not difficult to obtain the virus of measles unmixed with other microbes, and in such form that it may be studied by various methods."

ABSTRACTS

Spontaneous Rupture of the Heart in Infants.—William Harvey was the first to observe a case of rupture of the heart, and at no time has a case been seen in a child less than one year old until recently, when a case came under the observation of L. SCHAPS (*Arch. f. Kinderheilk.*, Vol. 40, Nos. 1 and 2). The most prominent cause of cardiac rupture is arteriosclerosis, but in this case it was a septic embolus that lodged in the heart muscle. This case is of considerable interest, as it furnishes a new cause to that long list of causes of sudden death in infants. A child of four months was brought to the hospital, badly nourished and presenting small, discrete, subcutaneous abscesses in the back, head and extremities; there was a maculopapular exanthem, the bridge of the nose was depressed, the child had snuffles and excoriations about the nose. The spleen and liver were enlarged, and there were small papules about the arms. A swelling of the lower end of the left forearm proved on radioscopy to be a swelling of the epiphysis of the radius. The case was clearly one of congenital syphilis, and was given inunctions of one-half gram of ung. cin. pro die, and was nourished by means of expressed woman's milk. Four days later there occurred a sudden rise of temperature. The next day a few fine râles were heard over the pericardium, and in the afternoon, one-half hour after feeding, the child died suddenly. At autopsy the pericardium was found filled with thin blood and dark necrotic fragments. There was a fibrinous exudate over the pericardium. In the middle of the left ventricle there was a perforation 3 mm. in diameter, in the neighborhood of which the heart muscle was soft and friable. Here was an abscess $\frac{1}{2}$ cm. long in the wall of the left ventricle, sharply circumscribed, dark red in the periphery and yellow in the center. There was also a small abscess near the apex of the heart. Microscopical examination showed that the muscle in the neighborhood of the rent was quite necrotic and the nuclei did not take up the stain. Staphylococci were found. The case was one of staphylococcus sepsis (independent of lues), originating in the subcutaneous abscesses. The frequent occurrence of septic processes in infants originating like the above must be borne in mind.

The Passage of Bromide into Woman's Milk.—If bromide be given to the mother in customary doses it passes into the milk, but only in traces, according to H. ROSENHAUPT (*Arch. f. Kin-*

derheilk., Vol. 40, Nos. 1 and 2). It can thus have no therapeutic value if administered by this route. Yet the possibility that pathological processes in infants may come from the administration of bromide to the mother is suggested by the case of acne in an infant immediately disappearing upon the mother ceasing to take bromide.

History of Pediatrics.—This subject, together with its relation to other sciences, was ably presented at the recent Congress in St. Louis by A. JACOBI (Am. Med., Nov. 5, 1904), and the conclusions at the end of the address are well worthy of note. He states that "pedology is the science of the young. The young are the future makers and owners of the world. Their physical, intellectual and moral condition will decide whether the globe will be more Cossack or Republican, more criminal or more righteous. For their education and training and capabilities the physician, mainly the pediatricist, as the representative of medical science and art, should become responsible. Medicine is concerned with the new individual before he is born, while he is being born and after. Heredity and the health of the pregnant mother are the physician's concern. The regulation of labor laws, factory legislation, and the prohibition of marriages of epileptics, syphilitics and criminals are some of his preventive measures to secure a promising progeny. To him belongs the watchful care of the production and distribution of foods. He has to guard the school period from sanitary and educational points of view, for heart and muscle and brain are of equal value. . . . And in the near future the pediatricist is to set in and control school boards, the health department and the legislature."

The Lymphoid Affections of the Upper Air Tract of Children.—W. F. CHAPPELL (Med. Record, Nov. 12, 1904) describes the anatomy, functions and diseases of the pharyngeal and faucial tonsils. Adenoids may be hard or soft, and often decrease in size between two examinations, owing to change in the patient's systemic condition. The relative degree of development or dimensions of the nasopharynx is an important factor in determining the danger line of the pharyngeal tonsil, as is also the temperament of the child. An acute pharyngeal tonsilitis of a catarrhal nature is quite common in small children, without any other part of the lymphoid ring being affected. It is usually the result of a cold, and attacks the vertical clefts of the gland. The chief symptoms are high fever, the temperature rising to 105° F., extreme prostration, and some enlargement and tenderness of the posterior cervical glands. He believes that an affection of the pharyngeal

tonsil causes more systemic disturbance than similar affections of any other lymphoid tissue. Conditions requiring differential diagnosis from adenoids are: (1) Lymphatism, (2) syphilitic (4) digestive disturbances, (5) congenitally high-arched palate, and gonorrheal rhinitis, (3) congenital occlusion of the nares, (6) small or occluded nostril, (7) unusually small postnasal space, (8) anterior projection of the bodies of the cervical vertebrae, (9) some malformations of the soft palate, and (10) hypertrophy of the tongue. In deciding whether the faucial tonsils are sufficiently enlarged to require removal, care is needed not to overlook so-called buried tonsils which lie hidden between the lateral pharyngeal wall behind and the opercular fold in front, and extend high up into the lateral pharyngeal vault. This is sometimes a more dangerous condition than the marked hypertrophy of the gland which occupies a large part of the pharyngeal space. If small, adenoids and tonsils not causing symptoms may be treated by non-operative means; but large tonsils and lymphoid masses in the nasopharynx should be removed, even if they do not produce symptoms. The author prefers to operate at an early hour of the morning, and usually under general anesthesia. Gas and ether is the anesthetic of choice for children over three years old; for younger patients, chloroform may be used to start with, followed by ether. Chloroform alone is considered very unsafe.

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The University of Halle, Germany, has conferred upon Dr. Willy Merck, member of the old house of E. Merck, Darmstadt, established in 1668, a very high distinction, namely, the honorary degree of Doctor of Medicine, "in recognition of numerous meritorious contributions looking to the advancement of the therapeutic side of medicine."

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"PAINFUL MENSTRUATION IN VIRGINS."

Dr. Wm. Sellman, of Baltimore, read this paper and pointed out the necessity of giving relief to young unmarried women who suffered from painful menstruation. He considered the forms of dysmenorrhea that could be relieved by operation. These means should not be of a character to unsex the patient. Lastly he spoke of that class of cases in which dysmenorrhea was due to a general systemic neuralgia. In these cases electricity in its different forms afforded great relief. It was doubtful in many of these cases whether the removal of the appendages would accomplish anything more than bring about a premature menopause.

Dr. H. W. Longyear of Detroit stated that in operating, if one ovary or a part of an ovary could be saved he did so. He would enter a protest against operating on cases of dysmenorrhea that were of short duration in young girls.

Dr. William Humiston of Cleveland, Ohio, had seen cases with a narrow, conical os menstruating without the least sign of distress, but the moment an inflammatory condition of the mucosa was added, that moment began to have painful menstruation.

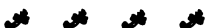
Dr. D. Tod Gillian, Columbus, Ohio, spoke of the undeveloped condition of the uterus as a cause of dysmenorrhea. It was not the result of stenosis of the internal os, but to an unripe condition of the uterine tissues.—*Med. Review of Reviews.*

The thing that surprises us most in the above article is that not a single voice was raised to proclaim the almost magical effects of antikamnia tablets in such cases. We can readily recall quite a number of cases in which extreme suffering (dysmenorrhea) was promptly relieved, not by operation, but by antikamnia tablets. Evidently these men were surgeons only.—*Ed Massachusetts Med. Jour., January, 1905.*

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THE IMPORTANCE OF SUSTAINING THE VITAL RESISTING POWERS, WITH ILLUSTRATIVE CASES.

By LAFAYETTE BENNETT, M.D., CENTRAL CITY, KY.

An eminent teacher of medicine, in a lecture to his class of students, declared that the greatest difference between the therapeutic methods employed by our forefathers and ourselves consisted, most of all, in the fact that the intelligent physician of to-day fully comprehended the importance of conserving the strength of his patients—the maintenance of their resisting powers. The maintenance of these powers is the key to the situation, and failure to recognize its importance is responsible for the greatest number of unfavorable issues. This principle applies alike in all disease processes—acute or chronic.

Osler, in the chapter on treatment of tuberculosis in his work on practice, says that there are three indications for treatment, and the *first* is: "To place the patient in surroundings most favorable for the maintenance of a maximum degree of nutrition." This may be said to be a principle applicable not only in the treatment of tuberculosis, but of all morbid processes. Phthisis is an affection in which the waste of tissue exceeds its nutrition—but only a moment's reflection is necessary to bring to the mind of the practitioner the fact that in other—and in truth, all—diseases there is a greater or less degree of interference with normal metabolism. It is the attention to this point that renders one physician successful in a certain class of diseases. If, in the management of pneumonia, typhoid fever, or any disease where tissue-waste is marked, the maintenance of the resisting power is lost sight

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